
Archives of PHYSICAL MEDICINE

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(Formerly Archives of Physical Therapy)



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NO. 10

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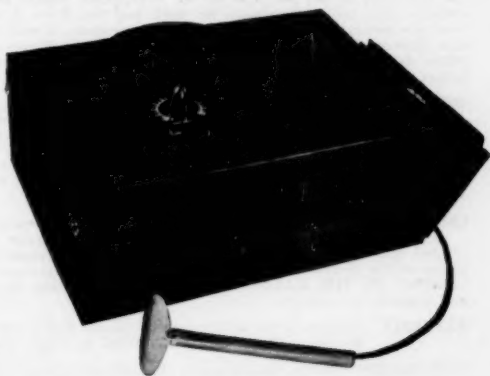
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ARTHUR L. WATKINS, M.D.

Boston, Massachusetts

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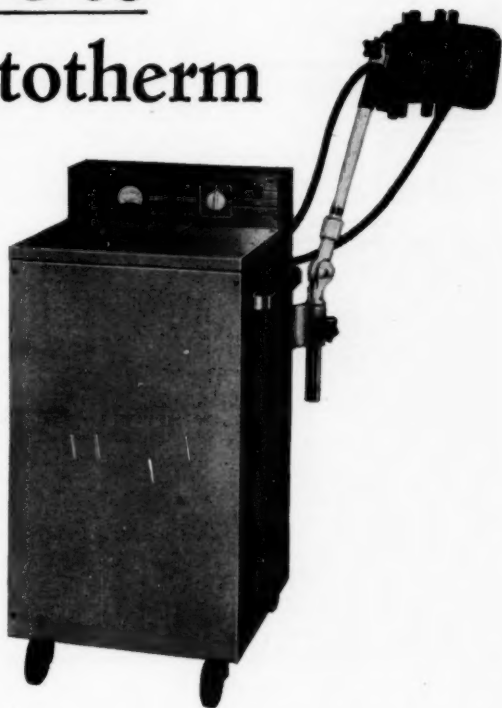
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Hospitals, 43 Assistant Residencies and Residencies, 87

| Name of Hospital | Location | Chief of Service | Inpatients Treated | Number of Treatments | First Year Residencies Offered* | Total Residencies Offered* | Beginning Stipend (Month) |
|---|----------------------|--------------------|--------------------|----------------------|---------------------------------|----------------------------|---------------------------|
| UNITED STATES ARMY | | | | | | | |
| Letterman Army Hospital* | San Francisco | R. C. Paaki | 3,330 | 74,961 | 1 | — | — |
| Fitzsimons Army Hospital* | Denver | H. B. Luscombe | 19,403 | 285,913 | 1 | 4 | — |
| Army Medical Center* | Washington, D. C. | J. H. Kuitert | 6,755 | 285,456 | 3 | 6 | — |
| VETERANS ADMINISTRATION | | | | | | | |
| Veterans Admin. Hospital* | Long Beach, Calif. | R. N. Nyquist | 10,922 | 195,816 | 1 | 2 | — |
| Veterans Admin. Hospital* | Fort Logan, Colo. | F. J. Fricke | 907 | 36,326 | — | — | — |
| Veterans Admin. Hospital* | Hines, Ill. | L. B. Newman | 5,465 | 450,711 | — | 4 | — |
| Veterans Admin. Hospital* | Wadsworth, Kans. | L. Blau | 3,169 | 192,760 | — | — | — |
| Veterans Admin. Hospital* | Frammingham, Mass. | F. Friedland | 7,000 | 210,000 | 1 | 3 | — |
| Veterans Admin. Hospital* | Jefferson Bks., Mo. | E. H. Weissenb'g | 2,215 | 77,481 | 1 | 1 | — |
| Veterans Admin. Hospital* | New York City | A. S. Abramson | 12,519 | 314,025 | 3 | 9 | — |
| Veterans Admin. Hospital* | Cleveland | H. T. Zankel | 6,414 | 81,929 | 1 | 1 | — |
| Veterans Admin. Hospital* | Portland, Ore. | E. W. Fowles | 4,854 | 110,420 | 1 | 1 | — |
| Veterans Admin. Hospital* | Aspinwall, Pa. | S. Machover | 2,516 | 106,131 | — | — | — |
| Veterans Admin. Hospital* | Houston, Tex. | B. L. Boynton | 1,582 | 6,894 | 1 | 1 | — |
| NONFEDERAL | | | | | | | |
| Los Angeles County Hospital* | Los Angeles | E. Austin | — | 91,836 | — | 1 | 165 |
| White Memorial Hospital* | Los Angeles | F. B. Moor | 195 | — | 1 | 1 | 129 |
| University of Colorado Medical Center | — | — | — | — | — | — | — |
| Colorado General Hospital* | Denver | H. L. Dinken | 2,580 | 45,876 | 1 | 3 | 75 |
| State of Connecticut Vet. Home & Hosp. | Rocky Hill, Conn. | — | — | — | 3 | 3 | — |
| Emory University Hospital* | Emory Univ., Ga. | R. L. Bennett | 1,719 | 10,473 | 1 | 1 | 59 |
| Georgia Warm Springs Foundation | Warm Springs, Ga. | R. L. Bennett | 973 | 104,401 | 1 | 3 | 250 |
| Cook County Hospital* | Chicago | D. Kobak | 7,501 | 37,516 | — | — | — |
| Michael Reese Hospital* | Chicago | C. O. Molander | 2,254 | 19,569 | 1 | 1 | 25 |
| Northwestern University Medical Center | Chicago | — | 12,590 | 40,952 | — | — | — |
| Research and Educational Hospitals* | Chicago | H. W. Kendell | 5,688 | 11,769 | 1 | 3 | 55 |
| University of Kansas Medical Center* | Kansas City, Kans. | D. L. Rose | 2,456 | 42,310 | 1 | 1 | 100 |
| Massachusetts General Hospital* | Boston | A. L. Watkins | 2,925 | 31,999 | 0 | 9 | 41.66 |
| University Hospitals* | Ann Arbor, Mich. | — | — | — | — | — | — |
| University of Minnesota Hospitals* | Minneapolis | M. Knapp | 20,409 | 29,426 | 4 | 4 | — |
| Mayo Foundation | Rochester, Minn. | F. H. Krusen | — | — | 2 | 6 | 135 |
| Harnes Hospital* | St. Louis | S. Mead | 9,759 | 9,759 | 0 | 1 | — |
| Belleuve Hosp., Div. III, N. Y. Univ.* | New York City | H. A. Kunk | 4,958 | 116,795 | — | 7 | 80 |
| Goldwater Memorial Hospital* | New York City | M. Dacso | 733 | 50,706 | 1 | 2 | 80 |
| Hospital for Joint Diseases* | New York City | J. Weiss | — | 94,631 | 1 | 1 | 40 |
| Hospital for Special Surgery | New York City | K. C. Hansson | 29,806 | 40,819 | 1 | 1 | 160 |
| Mount Sinai Hospital* | New York City | W. Bierman | 11,942 | 36,970 | 1 | 1 | 50 |
| New York City Hospital* | New York City | P. K. Safford, Jr. | 1,128 | 41,088 | 1 | 1 | 130 |
| Presbyterian Hospital* | New York City | W. B. Snow | 35,865 | 102,546 | 1 | 1 | 298 |
| St. Luke's Hospital* | New York City | E. Muller | 900 | 95,954 | 1 | 1 | 60 |
| Rehabilitation Hospital | W. Haverstraw, N. Y. | M. Hoberman | 5,568 | 408,371 | 1 | 1 | 225 |
| Cleveland Clinic Hospital* | Cleveland | W. J. Zeiter | 17,062 | 38,475 | 1 | 4 | — |
| Hospital of the University of Pa.* | Philadelphia | G. M. Pierson | 1,636 | 35,639 | 0 | 1 | — |
| Philadelphia General Hospital* | Philadelphia | A. A. Martucci | 2,827 | 22,733 | 1 | 1 | 75 |
| Medical College of Virginia—Hosp. Div.* | Richmond, Va. | W. J. Lee | 4,575 | 40,327 | — | — | 48.50 |

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The dagger (†) indicates temporary approval.

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| Mills College, Oakland, Calif. | Elia H. Hill | High sch. | 2 yrs. | Varies | 18 | \$584 | Certificate |
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| Letterman Army Hospital, San Francisco, California | Olena M. Cole, Maj., WMSC | Affiliated with the Medical Field Service School | | | | | |
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| Duke University, Durham, N. C. | A. J. Kohls, M.D. | f | 2 yrs. | Sept. | 16 | \$100 | Certificate |
| Cleveland Clinic Hospital, Cleveland* | Sister Mary Imelda | a-b-d | 12 mos. | Sept. | 6 | \$100 | Certificate |
| D. T. Watson School of Physical Therapy, Leetsdale, Pa.* | Bedrick F. Kelly | a-b-d | 4 yrs. | Sept. | 60 | \$1,200 (2 yrs.) | Cert. & Degree |
| Division of Physical Therapy of the School of Auxiliary | J. W. Gormley, M.D. | a-b-d | 12 mos. | Sept. | 60 | \$1,200 (2 yrs.) | Cert. & Degree |
| Medical Services of the University of Pennsylvania, | W. B. Nichols, M.D. | a-b-d | 12 mos. | Sept. | 60 | \$1,200 (2 yrs.) | Cert. & Degree |
| University of Texas School of Medicine, Galveston* | G. G. Deaver, M.D. | a-b-d | 12 mos. | Sept. | 60 | \$1,200 (2 yrs.) | Cert. & Degree |
| Hermann Hospital, Houston, Texas* | Elizabeth C. Addoms | a-b-d | 12 mos. | Oct. | 12 | \$350 | Certificate |
| Baruch Center of Physical Medicine and Rehabilitation, | Helmut K. Water, M.D. | a-b-c | 12 mos. | Oct. | 12 | \$200 | Diploma |
| Medical College of Virginia, Richmond* | Dorothy Spark | a-b-d | 12 mos. | Oct. | 12 | \$200 | Diploma |
| University of Wisconsin Medical School, Madison* | Kathryn Kelly | a-b-d | 12 mos. | Oct. | 12 | \$200 | Certificate |
| | G. M. Piersol, M.D. | e | 12 mos. | Feb/Sept | 32 | \$600 | Cert. & Degree |
| | Dorothy E. Baehle | f | 4 yrs. | Sept. | 4 | \$149 | Cert. or Degree |
| | G. W. N. Eggers, M.D. | a-b-d | 12 mos. | Jan. | 8 | \$300 | Certificate |
| | Ruby Decker | a-b-d | 12 mos. | Oct. | 15 | \$300 | Certificate |
| | D. O. Schie, Jr., M.D. | a-b-d | 12 mos. | Sept. | 68 | \$300 | Diploma |
| | Herbert Park, M.D. | a-b-d | 4 yrs. | Sept. | 20 | \$40 | Certificate |
| | Susanne Hirt | a-b-d | 12 mos. | Sept. | 20 | \$40 | Certificate |
| | H. D. Bouman, M.D. | a-b-d | 12 mos. | Sept. | 20 | \$40 | Certificate |
| | Walter A. Kohl | a-b-d | 12 mos. | Sept. | 20 | \$40 | Certificate |

with college course 2 yrs. Four years of college with college course; f = High school graduation.
 2. Nonresidents charged additional fee.
 3. Graduation fee \$100.00. Tuition fee \$250.00 for each of the first three semesters, and \$112.50 for the fourth semester, making a total of \$900.00 for two years.

** Based on part 3 A. M. A. 148:137 (May 19, 1953).
 1. Courses are so arranged that any of the entrance requirements may be completed in one year.
 2. Graduation fee \$100.00. Tuition fee \$250.00 for each of the first three semesters, and \$112.50 for the fourth semester, making a total of \$900.00 for two years.

THE TRAINING OF THE PHYSIATRIST*

ROBERT L. BENNETT, M.D.

Georgia Warm Springs Foundation,
Warm Springs, Georgia
Emory University Hospital,
Emory University, Georgia

It is reasonable to assume that training in any branch of medicine must be based first, on the known demands that will be made of the specialist in actual practice and second, on the trends that appear to indicate the future pattern of practice in that specialty. In new or in rapidly expanding fields it is likely that the present demands as well as the future possibilities may be difficult to define with any degree of accuracy. The problem of training is likely to be confused and inadequate unless the teachers remain students and teach only as they continue to learn. The training of the Psychiatrist is in this position today.

Even though we appreciate the stabilizing influence of recognition by the American Medical Association and the ever increasing numbers of men coming into the field, it must be admitted that we still cannot clearly visualize any but the most prominent features of the Psychiatrist and but sketchily outline the boundaries of his field. Because of this, it seems hardly necessary to emphasize that the formal post graduate residency in physical medicine and rehabilitation, important as it is, can be but one phase of the training of the Psychiatrist. Training must not only be given young physicians interested in specialization, but must be given to the specialist for the extent of his professional life. This latter training is the mutual responsibility of all Psychiatrists in our daily practice and, perhaps most important of all, the responsibility of the professional organizations that represent our field of physical medicine and rehabilitation.

In the not too distant past, the specialist in what is now known as Physical Medicine bore little resemblance to the specialist of today. At that time he was simply a physician or surgeon who became interested in some one of the physical agents and emphasized its use in his practice. In this way almost every physical agent that we use today as only a part of the over-all treatment in carefully selected disease conditions, was at one time used in, and frequently claimed to be the cure for practically all the ills of man. As the more specific values and limitations of these physical agents were realized, it was logical that they should be grouped together and placed under the supervision of a physician trained in their proper application. This physician became a Psychiatrist, that is, a specialist in the use of physical agents in the diagnosis, prevention and treatment of disease. Because he dealt primarily with tools to be used in the treatment of patients of other specialists, and because his prescriptions for the use of physical agents were carried out in whole or in part through the hands of trained therapists, he was required to become an administrator as well as a physician — in some cases perhaps more of an administrator than a physician. Through his efforts, research of the highest caliber has given scientific justification of empiric findings, at times limiting but often expanding the application of these physical agents.

* Presidential Address, read at the Thirtieth Annual Session of the American Congress of Physical Medicine, New York City, August 26, 1952.

New tools were discovered and old ones modified for greater effectiveness. A solid foundation was laid and is being built upon today.

But the trends of today point toward a somewhat more varied pattern for tomorrow. As the usefulness of physical agents in medicine became better understood and their effectiveness in rather sharply defined fields of practice became evident, it was only natural that the Physiatrist developed particular interest in those diseases in the care of which his tools, his skills and his facilities played a major role. He began to specialize in these diseases. In general, these were, and are, the subacute and chronic diseases that limit effective bodily movements, with psychologic, vocational and social implications far beyond the care of the physical handicap itself. Thus physical medicine and total rehabilitation of the physically handicapped became a reasonable alliance.

This specialization in the over-all problems of these diseases is an important and very necessary part of the development of our specialty. It seems unlikely that our future will be determined by the continued development of electronic apparatus and of exercise routines, particularly as applied to the patients of other specialists. If certain existing problems in medicine appear to be solved best by the skills and facilities of the Physiatrist, he must be thoroughly trained in those diseases. Those diseases, in whole or in part, should be considered his responsibility if he consistently achieves the more rapid and complete control of them. The line dividing medical specialties can never be sharply drawn, simply because specialties do not create diseases. The diseases create the specialties by their demands for specialized interest and skills. No specialty can claim the sole right to care for any problem in medicine unless its results prove consistently superior to those of all others.

One of the advantages of focusing attention on specific diseases is that our own research arising from the challenge of these diseases is more likely to specifically benefit the field of physical medicine and rehabilitation. The value of discoveries made by any field might well be appraised on the basis of their benefit to all branches of medicine; but perhaps it cannot be considered wholly selfish to wish to promote one's own field first and the other fields second.

It should be obvious that a residency program cannot be expected to turn out a finished product, but at best should be considered the most practical means of bringing into sharp focus those problems of diagnosis, prevention and treatment that come within the responsibility of that field in which the specialist is expected to be expert. The resident's past experience in medical school and internship dealt first with the foundations on which all medical specialties are built and later with outline training in each. At this stage of his career the young doctor probably knows more about all phases of medicine than he ever will again. This permits him to select the several fields of his greatest interest and to take advantage of opportunities for further training in any one of these fields. He is attracted to a field for one or a combination of several fairly evident reasons, such as the general type of disease treated, the financial return possible, the prestige inherent in certain specialties, and the possibilities for rapid advancement. In the final analysis, however, the student and intern is influenced by what he sees is being done by the specialist with whom he comes in contact. Therefore, the ability of a specialty to attract young graduates must ultimately depend on the representation of that specialty in the medical school during his internship years. It is beyond the scope of this paper to discuss curricula at any level of training, but it is necessary here to emphasize that during these important medical

school and internship years, physical medicine must be clearly represented as a specialty, and not only as the study of a group of physical agents with application in practically every field of medicine and surgery.

If this brief discussion of the present and probable future of physical medicine is valid, and if the Physiatrist is to be a specialist in diseases as well as in tools, the essential content of an adequate residency program is evident. In broad outline it must encompass the following essentials:

1. — *Training in those basic sciences necessary to intelligent prescribing as well as to personal application of the fundamental physical agents identified with physical medicine:* At this level of training there seems little justification in repeating formal courses of preclinical sciences already covered in the premedical and medical school years. The necessary knowledge and skill is better taught in most instances by the specialist with broad experience in patient care. Part of this training should be spent in guided scientific evaluation of the merits of physical agents, if possible with facilities for basic and clinical research, certainly with specific responsibilities in the use of the medical library.

2. — *Training in the diagnosis, definitive treatment, and total rehabilitation of patients with those subacute and chronic diseases affecting bodily movements in which the use of physical agents constitute major therapy:* This training must include specific instruction in allied fields, particularly Neurology, Psychiatry, Orthopedics and Internal Medicine, so that the certain basic knowledge and techniques in these fields may be used by the Physiatrist in his practice, and so that specialists in these fields may be consulted intelligently by the Physiatrist when necessary to total care. This phase of training should be provided by services dealing with men, women and children, and should be designed to develop specialists in total care. It should be evident that residency programs can no longer be considered adequate if they provide little more than training and supervision of ancillary personnel, or if they are limited to patients of certain age and sex.

3. — *Training in departmental supervision and direction:* This training should include over-all hospital administration to acquaint the physician with hospital management so that he can appreciate the necessary administrative, professional and financial responsibility of all the component parts that make up the modern hospital or clinic.

4. — *Training in the therapeutic purpose, educational background, potentials or limitations of recognized ancillary personnel upon whom the physiatrist must depend for certain phases of patient care:* This should include appreciation of the historical background and scientific contributions of these groups so that the physician's responsibilities to them is just and without prejudice.

5. — *Training in the proper utilization of and cooperation with national, state and local agencies, both governmental and private, that are capable of assisting the field in its development and the patient in total care:* This must entail some instruction in laws at the several levels of government concerned with the disabled individual.

6. — *Training in the professional purpose and accomplishments of existing organizations that represent the field of physical medicine:* This training should also emphasize the responsibility of the Physiatrist to these organizations.

Undoubtedly the greatest responsibility for the training of the Physiatrist, after his residency training is finished, rests with the organizations representing physical medicine and rehabilitation. These organizations must in large part determine the future of this specialty. Obstacles to the full development of this specialty still exist. Fortunately, the problem of recognition is well on the way to solution, but cannot be completely solved until every medical school, hospital and clinic consider physical medicine and rehabilitation an essential part of its service. This seems assured if we continue to develop and maintain high levels of professional competence. If this is so, then our greatest problem today is the development of a unity of purpose.

Until the boundaries and content of this specialty are more specific, there will always be danger of divergence of effort and direction. The development of specialties within specialties is an indication of progress, and is inevitable in the broad field of physical medicine and rehabilitation. Likewise, the very

nature of the specialty requires the development of ancillary personnel with extensive and multiple skills. These developments, while necessary, are not without their dangers. The Physiatrist, through his organizations, must be taught not only to develop and guide these necessary skills but also must be taught the importance of maintaining leadership and control over these groups.

The American Congress of Physical Medicine and Rehabilitation must continue to critically reflect that which is best in physical medicine and rehabilitation in the United States. Its annual meetings must continue to acquaint all other fields of medicine with the possibilities of this field. But above all else it must point the way to the future and mold the field into a tightly bound, scientific and purposeful group. Local sections of this Congress, smaller national and local organizations, must support the over-all work of the Congress by more specific scientific programs and teaching seminars, and in this manner indicate the trends and patterns for specialized training. The American Board of Physical Medicine and Rehabilitation is one of eighteen boards representing recognized medical specialties. Its representation on the Advisory Board of Medical Specialties enables it to set up and maintain standards consistent with those of other specialties. In this way the Board can be of great service. However, at best, a specialty board is simply a watch dog guarding the portals of specialization and can do little more than carry out the orders of the specialists within. The recent formation of the International Congress of Physical Medicine was a highly important and necessary step toward unity of purpose. The first meeting in London was impressive and inspiring. It must be supported by all of us in the field.

It should be emphasized that the training of the Physiatrist rests with each of us, in our residency programs, our daily contacts with each other, and in our professional organizations. Physical medicine and rehabilitation is not so much endangered by its relatively small numbers as it is and has been by attempts to fill responsible positions with untrained men. Many of the problems that plague us today can be traced not only to lack of training in the disciplines of the specialty but also to lack of training the Physiatrist in his responsibility to the specialty.

The problem of recognition has been largely solved. The other problems are many, but all can be solved by knowing where we're going and training men to get us there.



THE FIGHT AGAINST POLIOMYELITIS *

Everybody's Business

BASIL O'CONNOR

President, National Foundation for Infantile Paralysis

NEW YORK

When your president, my good friend Dr. Robert L. Bennett, asked me to talk to you tonight, I accepted that invitation promptly and gladly.

We are not strangers. Despite our different techniques we are co-workers in a great humanitarian effort. We have many problems yet to solve.

As the result of being president of the National Foundation for Infantile Paralysis for 15 years, I have a keen interest in physical medicine and rehabilitation, and I have a very real personal interest, too.

For a quarter of a century I have witnessed, at first hand, the impairment of human bodies by an epidemic, crippling disease — poliomyelitis. For a quarter of a century as a layman I have worked with you and many others seeking to solve the problems arising from widespread incidence of this disease throughout the nation. My service goes back to the days when rehabilitation, at least as applied to the poliomyelitis patient, often consisted only of getting acquainted with a pair of crutches. My first full comprehension of the meaning of rehabilitation came as I watched the grim struggle between Franklin D. Roosevelt and the disease to which he refused to surrender. And, with him, I became acutely aware that there were others — thousands upon thousands of others — who needed help. But adequate assistance was not available to them because society then was not equipped to give it. The reasons were many — lack of knowledge, lack of equipment, lack of personnel, lack of money, and some apathy. Whatever the cause, the poliomyelitis patient of twenty-five years ago was pretty much on his own.

Today, after all these years of fighting poliomyelitis, I am more vitally concerned than ever before with the needs of those who are struggling to overcome disabilities resulting from any disease. That is the natural development of sincerity in this kind of humanitarian activity. It is never possible to let down in a fight such as this, once it has been joined. Yet every advance seems to uncover new areas of need. Every accomplishment suggests a new point of attack.

I wish I could say that after our numerous successes in the fight against poliomyelitis, the conditions of twenty-five years ago had been completely eradicated, that science and medicine and the American people had reached the point at which maximum rehabilitation is assured for every poliomyelitis patient in the nation. I wish I could say further to you that every community has available the facilities, the personnel and the funds for a fully effective rehabilitation program, not only for the victims of poliomyelitis, but for the hundreds of thousands disabled by other diseases, by wars and accidents, and by congenital abnormalities. You know how untrue such statements would be. Despite the fact that much has been accomplished in creating techniques, therapies and prosthetic appliances that open up new worlds of activity for many handicapped persons, we know that we are merely scratching the surface in applying the knowledge we already have on the gigantic scale necessary to reach all who need help.

* Delivered at the Thirtieth Annual Session of the American Congress of Physical Medicine, New York City, August 27, 1962.

Let me indicate some of the real and interesting problems that confront the National Foundation — problems in the solution of which you are interested because poliomyelitis patients look to you so eagerly for help. Across the nation, poliomyelitis once again is filling hospitals and clinics with its victims. From present indications, it appears that 1952 may be the worst poliomyelitis year of all time. We hope it will not be. But whether it is or not, it is already apparent that many more of our people will be added to the lists of the physically disabled. We are concerned, of course, because the annual incidence of poliomyelitis is remaining at a high level, year after year, with no respite. By the end of 1952 it will be a matter of record that the past five years were the heaviest epidemic years in the nation's history.

But other aspects of the epidemic pattern call for attention if we are to meet the obligations of the future. Poliomyelitis is no longer confined to several high-incidence areas each year. Today, in addition to numerous points of extreme emergency, the disease has spread out to a lesser degree across every section of the country. The result is a cumulative impact that is not easily absorbed. Where the disease was once a special problem in a relatively small number of communities each year, today it has become a continuing burden for thousands of communities in every one of the forty-eight states. The National Foundation first met the challenge of poliomyelitis epidemics by a centralized defense system. With headquarters in New York as the guiding force, help was given to an emergency area not only directly but also channelled from the surrounding states, and sometimes from points thousands of miles away. Nurses were recruited through the American Red Cross for epidemic duty, physical therapists were secured through the American Physical Therapy Association, and the entire resources of personnel and equipment from unaffected areas were made available to the point of need.

To a great extent, this system is still the mainstay of our epidemic defense. But its operation is becoming increasingly difficult. Today, when the call goes out for physical therapists, nurses, and other skilled workers necessary for the proper care of the poliomyelitis patient, the answer is a growing dearth of such personnel free to serve outside their own communities. Most localities now have their own problems. Five years of heavy epidemics have left their mark all over the nation. Every community has its backlog of residual cases that are being treated on a continuing basis. And over all hangs the constant threat of new attacks, and the fear that if they surrender their own workers, they will find themselves unprepared when the blow strikes at home. Unfortunately these fears too often mature into reality. Such was the case in Sioux City, Iowa, where 22 poliomyelitis patients were admitted to hospitals in a single 24-hour period just a few weeks back. Such pressure, suddenly exerted upon hospital staffs, may jeopardize the entire patient-care program of the community, unless the crisis is met, and met quickly.

This year, as early as the first week in August, serious shortages of trained personnel brought appeals for help from such metropolitan areas as Chicago, St. Louis, Detroit and Cleveland; from Dallas, Houston, New Orleans and Baton Rouge; from Omaha, Louisville, Sioux City and Des Moines. Their local reservoirs of physical therapists and nurses had been exhausted. They could not help others. They needed help themselves. Translate this into the plight of rural and semi-rural areas which normally depend upon the metropolitan areas to assist in emergencies, and the over-all problem becomes obvious. The little community of Sparta, Wisconsin, with a population of

6,000 persons, suddenly found itself with 22 cases of poliomyelitis. Among the 58 residents of Prue, Oklahoma, 8 had infantile paralysis. Sherman, Texas, with a population of 20,000, had 27 cases. These are the kinds of reports we've been getting for the past several months. And they are all early reports, with the heaviest poliomyelitis months still to come.

How do we face up to this situation? How do we meet the fact that we cannot fill all present and future personnel shortages on a volunteer recruitment basis? It is not a question of money. Financial responsibility for the temporary redistribution of skilled workers, including travel expenses, maintenance and, in some cases, the supplementing of salaries on emergency duty, is borne by the March of Dimes. It is a case of having skilled human beings physically present at the side of the patient when they are needed. They are needed today, and they will be needed tomorrow and the next day, until long after the epidemics have been forgotten. But we will not have them, because they do not exist in the numbers needed.

A few years ago, when it became apparent that the pattern of poliomyelitis incidence was undergoing a change, we began to put more emphasis upon community responsibility. It was realized that a completely-centralized defense system was not the answer to widespread poliomyelitis. It fails initially because there just are not enough trained people to go around, and it fails also because existing resources of personnel are not equitably distributed throughout the country. If we are to meet the challenge of continued widespread incidence, with its inevitable toll of residual cases spread far and wide across the nation, it is imperative that we seek methods of making existing services go farther than they now do, until such time as our supply of trained personnel is intelligently increased.

We are all agreed that, whether it is in the rehabilitation center or the clinic, the hospital or the home, every effort must be made to shorten the period of the patient's dependence upon others. This can be done only if we recognize that the person stricken with paralytic poliomyelitis starts to get well from the moment he gets sick. The process of rehabilitation then becomes everybody's business. Everyone who normally comes in contact with the patient is involved in the pattern of getting well — his parents, his sisters and brothers, his physician, the nurse, the physical therapist, the medical social worker, the psychologist, his companions and his school mates. The concept of medical team work must be brought into play, with every member of the medical team cooperating to develop a total program of rehabilitation. The physician in charge is, of course, the natural leader of the team, a leader who, while he cannot be expected to know all there is to know about the many specialties that may be needed, must have a good concept of the job at hand. He must be able to recognize those cases in which the patient needs specialized service, and he must be able to see that service in relationship to the total problem of rehabilitation.

It is indicative of a total lack of knowledge of the situation that exists to think, at this time, that every disabled person who requires specialized services can be cared for at a specialized hospital under the direction of a specialist. The nation has neither the facilities nor the personnel to carry out such a program. The medical direction of the vast majority of poliomyelitis cases will continue to fall to the general practitioner, the pediatrician, the internist, the physiatrist, the orthopedist, the neurologist or other physician who is called in by the patient's family. It will be fortunate, indeed, if there is a physical therapist or occupational therapist in the community who can provide needed services under the direction of the attending physician.

It is the aim of the National Foundation to train more personnel in the whole field of physical medicine to fill at least some of the needs of the average community, where specialized facilities are non-existent. The program of physical medicine and rehabilitation is one of our major efforts. We are convinced that this is the most practical way of helping these patients. We look to the specialized physician, and particularly to the physiatrist, to share his knowledge and training with other members of the medical team to accomplish the mutual goal of maximum recovery for the patient. With this broad concept of rehabilitation in mind, the National Foundation is planning realistically today to meet tomorrow's problems. We have not in any way weakened our centralized defense system. But we are exerting every effort to build in each community a framework of knowledge that will permit the local health team to handle normal poliomyelitis incidence with the facilities and personnel at hand. The problem is one of creating the concept of rehabilitation in the minds of all whose services are needed by the patient. With some training and preparation, it is felt that many communities should be able to handle this problem with a minimum of outside help. We are fully aware that in the face of a full-scale epidemic no community can stand alone, and it is for this reason that we cannot abandon centralized emergency operations to provide money, personnel and equipment to hard-hit areas. But we will be in a better position to meet these true emergencies when we have encouraged every community to maximum self-help.

To carry out this program, the National Foundation already has spent 14 million dollars to prepare more qualified personnel in needed fields, and to promote professional and lay education regarding poliomyelitis. The National Foundation does not engage directly in the training of personnel, nor does it employ individuals for the practice of medicine and related professions. Through scholarships and fellowships to qualified individuals, we have financed their education and training at recognized institutions of learning, stressing those fields where shortages have been most acute. Since the National Foundation's professional education program was inaugurated in 1945, approximately 3,000 scholarships and fellowships have been awarded with March of Dimes funds. This is the largest program of its kind in existence today among the voluntary agencies. These awards have been given without any attempt to "corner the market" of professional workers in medicine and its related fields. The National Foundation has no strings on these men and women when their training is completed. They are not compelled by agreement to work exclusively with poliomyelitis. We have felt, instead, the need for increasing the availability of necessary services and broadening the concept of their value. If that can be accomplished, our specific interests will be advanced along with the others. I have said that every successful effort of the National Foundation has uncovered new needs that must be met. This has been especially true in the field of education. When the public gave enough money to warrant a major effort in that field, the National Foundation encountered the sometimes not well known fact that you just cannot go out in the market and buy hundreds of additional physical therapists, orthopedic nurses, or whatever you happen to need. Furthermore, we learned that the personnel shortage extended back as far as the teachers in these fields. Many schools lacked sufficient funds to develop properly their teaching programs. In most cases the programs required expansion. Standards of instruction were high in some places, dangerously low in others. All these things claimed attention from the moment of the National Foundation's very first effort in the education field, and with each passing year we have applied ourselves more diligently to helping others create a

sound base from which can arise an army of trained workers whose skills may be applied to the care and rehabilitation of the thousands of physically disabled individuals who will need medical assistance for many, many years to come.

The impact of the National Foundation's education program on the field of physical therapy alone has been truly dramatic, although, no doubt, the general public is hardly aware of our activity in this respect. It is cited merely as an example illustrating how we have been trying to cope with this increasing problem of lack of qualified personnel.

In 1944, there were less than 1,000 physical therapists in the United States who were not involved in armed services programs. And nothing was being done about it until, in conjunction with the American Physical Therapy Association, we went to the administrators of the physical therapy schools and asked what we could do to strengthen this vital profession. This resulted in the initiation of a three-point program of assistance with an outlay of \$1,300,000 in March of Dimes funds. We agreed to provide scholarships for students of physical therapy, we agreed to provide for the education of teachers for physical therapy schools, and we agreed to assist the Association in maintaining and improving standards of physical therapy education and employment.

By the end of last year, more than 1,800 physical therapy scholarships and 31 teaching fellowships had been awarded. Assistance had been given to 11 schools to improve their programs of instruction and enlarge their enrollment. At four schools equipment was provided for therapeutic exercise. The National Foundation has financed the development of teaching aids and made it possible for medical and technical directors of physical therapy schools to confer on their mutual problems and exchange ideas, opinions and information. At the close of World War II, when interest lagged in supporting schools of physical therapy, continued March of Dimes aid made it possible for at least one-half of all physical therapy schools in the country to continue their educational programs. As a result of this intensive effort by the National Foundation, there has been a substantial, though in no sense a sufficient, increase in the number of qualified physical therapists available not only for victims of poliomyelitis, but for all disabled persons. There has been a definite improvement in educational standards and in employment practices. And the ground work has been laid for educational programs that will continue to produce skilled workers for many years to come.

In the field of physical medicine, the National Foundation has long recognized the need for more physicians trained in this specialty. In 1943, funds were appropriated to assist in the development of a teaching and research program at the University of Pennsylvania. Since that time we have given financial assistance to five other medical schools in support of teaching programs in physical medicine at Emory University, Meharry Medical College, New York University, Washington University and Yale University. We have awarded 36 fellowships of from one to three years' duration in physical medicine. The result of these efforts is not immediately visible. It will take some time before the effect is felt in the community. But there is no shortcut to a solution of skilled medical personnel shortage.

In the attempt to develop a high degree of self-sufficiency on the community level, other problems were encountered. In the early years of the National Foundation, our local Chapters found their patient-care programs complicated by the fact that few hospitals would admit acute poliomyelitis patients. Most patients had to be cared for in the home, and our

early efforts, therefore, went into the development of teaching programs in home care, through the national organization of public health nursing. But the need for hospital care became more apparent with each year that passed, and so attention was directed more and more to convincing hospital administrators and public health authorities that early hospitalization in the acute stages of poliomyelitis sometimes spelled the difference between life and death, between normality and disability. As a result, hospital doors began to open to the poliomyelitis patient. And again, success was accompanied by new and more intricate problems. It was found that standards of care differed tremendously from hospital to hospital. Some hospitals were ill-equipped and inadequately staffed for the care of poliomyelitis patients. And, since the National Foundation's funds are public funds, it became necessary to measure carefully the quality and quantity of care received for the money expended. It became necessary to establish standards of care and tables of costs—no simple matter when applied across the entire nation. When the National Foundation was established in 1938 we had no idea how deeply it would shortly be involved in the basic health problems of the nation. But these issues were not ignored. The National Foundation faced them, working with hospitals, local health authorities, medical groups and public-spirited citizens. Assistance was given to the institutions wherever possible, and aided them in establishing effective programs of patient care.

Unfortunately, as a result of the opening of more hospitals to acute poliomyelitis patients, the public and many members of the medical profession came to think of the ailment as a disease requiring long periods of hospitalization. Actually, a survey of hospitals covering the period from June to November, 1950, showed that only 24 per cent of the patients remained in the hospital more than thirty days, and only eight per cent for more than 90 days. When one considers the dangers of psychic trauma, particularly for children separated for the first time from the security of their homes, it becomes necessary to examine closely the extent of hospitalization needed in each case. One of the National Foundation's major efforts today is the attempt to reduce the number of unnecessary hospital admissions. We are encouraging the use of diagnostic aid teams, working in homes or in clinics, to weed out non-poliomyelitis cases and those that may be treated without hospitalization. The present trend away from hospitalization for all cases is forcing our chapters and our national office to give greater attention to the coordination of all community resources for rehabilitation, such as visiting nurse and physical therapy services, out-patient clinics, vocational rehabilitation when required and, in some communities, the development of the rehabilitation center. With every year that passes, the value of the team concept of rehabilitation becomes more impressive. With every epidemic additions are being made to that team, new skills being employed, new techniques coming to light. It is the responsibility of all who are involved in any way in the process of restoring health to the stricken, to cooperate with one another, to share our accumulated knowledge, and to work toward the eventual enlightenment of all communities to the true meaning of rehabilitation.

Today, when it seems that science may be approaching the moment when control of paralytic poliomyelitis will become a reality, we whose specific interest lies with this disease see only hard work ahead. Long after the disease has been conquered, the thousands stricken in the past will need your help. Along with millions of persons whose lives have been altered by disease and accident, they will look for guidance as they grope for a way of life among their able-bodied fellowmen. As difficult as their lot may be, they will find that

they have a distinct advantage over those poliomyelitis patients whom I first met twenty-five years ago. They will find in our present society an understanding of their needs. They will receive intelligent care, and a chance to live again without complexes.

AN OBJECTIVE METHOD OF EVALUATING MUSCLE TIGHTNESS *

Preliminary Observations on the Effectiveness of Various Procedures in Producing Muscle Relaxation in the Hemiplegic Extremity *

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Resident in Physical Medicine and Rehabilitation

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DENVER, COLORADO

One of the most distressing difficulties in the rehabilitation of the hemiplegic is the spasticity which limits his functional capacity. Mild applications of heat have been commonly used in the treatment of the spastic extremity.¹⁻³ This usually includes hot packs,⁴ paraffin,⁴ and infra-red radiation.⁵ More recently mephenesin (Myanesin® Tolserol®) has been used by some to relieve spasticity⁶⁻⁸ in hemiplegics, while others have found tentanizing current to be of value.⁹ All of the above procedures were therefore tested in this study. In addition, because of the relaxing effect of constant current on muscle,¹⁰ and the effect of ethyl chloride spray in relieving the pain and spasm in myositis,¹¹ these two procedures also were studied.

Evaluation of the effect of these procedures in relieving spasticity has been difficult. Many techniques have been used in an attempt to measure the degree of spasticity in hemiplegia. Measurement of the height of the

* Abridgement of a thesis submitted by Dr. La Joie to the Faculty of the Graduate School, University of Colorado, in partial fulfillment of the requirements for the degree of Master of Science in Physical Medicine and Rehabilitation.

* Read at the Twenty-Ninth Annual Session of the American Congress of Physical Medicine, Denver, Colorado, September 6, 1951.

1. Krusen, F. B.: *Physical Medicine*, ed. 1, Philadelphia, W. B. Saunders Company, 1941, p. 296.

2. Watkins, A. L.: *Physical Medicine in General Practice*, ed. 1, Philadelphia, J. B. Lippincott Company, 1946, p. 162.

3. Patten, C. E.: *Heat in Diseases of the Nervous System*, Council on Physical Therapy of the A. M. A., *Handbook of Physical Therapy*, 1936, p. 52.

4. Dimken, H.: *Physical Treatment of the Hemiplegic Patient in General Practice*, J. A. M. A., 139:1286 (April 30) 1949.

5. Kovacs, R.: *Physical Medicine in Neuromuscular Affections*, M. Clin. North America 33:779 (May) 1948.

6. Schlesinger, E. B.; Drew, L. A., and Wood, B.: *Clinical Studies in the Use of Myanesin*, Am. J. of Med. 4:365 (March) 1948.

7. Stephen, C. R., and Chandy, J.: *Clinical and Experimental Studies with Myanesin (A Preliminary Study)*, Canad. M. A. J. 57:463 (Nov.) 1947.

8. Berger, F. M., and Schwartz, R. P.: *Oral "Myanesin" in Treatment of Spastic and Hyperkinetic Disorders*, J. A. M. A. 137:772 (June 26) 1948.

9. Lee, W. J.; McGovern, J. P., and Duvall, E. N.: *Continuous Tetanizing (Low Voltage) Currents for Relief of Spasm*, Arch. Phys. Med. 31:766 (Dec.) 1950.

10. Gersten, J. W.: *The Effect of Anodal and Cathodal Current and Novocaine Ion Transfer on the Tension Produced in Muscle by Direct Electrical Stimulation*, Arch. Phys. Med. 32:653 (Oct.) 1951.

11. Travell, J.: *Rapid Relief of Acute "Stiff Neck" by Ethyl Chloride Spray*, J. Am. Med. Womens Assoc. 4:59 (March) 1949.

knee-jerk¹²⁻¹³ and of the height of quadriceps contraction¹⁴ proved to be too variable to quantitate. Various mechanical procedures have been devised in which the acceleration of an extremity in response to an external force was used as an index of the degree of spasticity.¹⁵⁻¹⁷ More recently electromyographic techniques have been utilized to quantitate spasticity.¹⁸⁻²¹ With the

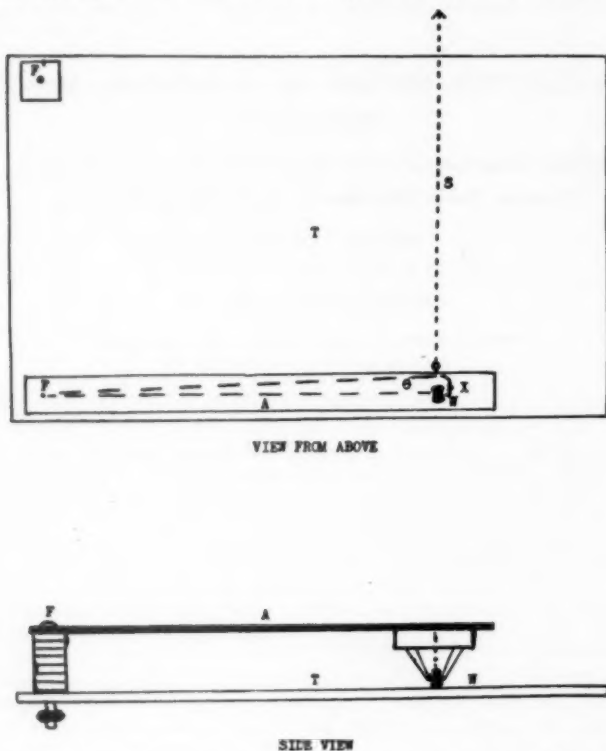


Fig. 1. — Diagram of Apparatus Used to Measure Resistance Offered to Passive Extension at the Elbow. A—Arm board to which forearm is strapped; T—Testing Board over which the wheel at the free end of the arm board rolls; F and F'—Axes of rotation for testing left and right arms, respectively; W—Wheel mounting; FW—Radius of the arc, 37.5 cm.; \odot —1.5 degrees of extension; X—1 cm. of movement on the arc; S—String going from arm board to pulley and weight pan.

12. Lombard, W. P.: The Variations of the Normal Knee-jerk and Their Relation to the Activity of the Central Nervous System, *Am. J. Psychol.* 1:112 (Nov.) 1937.
13. Jacobson, E., and Carlson, A. J.: The Influence of Relaxation Upon the Knee-jerk, *Am. J. Physiol.* 73:321 (July) 1925.
14. Courts, F. A.: The Knee-jerk as a Measure of Muscular Tension, *J. Exper. Psychol.* 24:521 (May) 1939.
15. McKinley, J. C., and Berkwitz, N. J.: Quantitative Studies on Human Muscle Tonus. I. Description of Methods, *Arch. Neurol. Psychiat.* 19:1636 (June) 1928.
16. Schaltenbrand, G.: Muscle Tone in Man, *Arch. Surg.* 10:1874 (May) 1929.
17. Smith, A. E.; Martin, D. S.; Garvey, P. H., and Fenn, W. O.: A Dynamic Method for Measurement of Muscle Tonus in Man, *J. Clin. Investigation* 8:597 (June) 1939.
18. Hoefer, P. F. A., and Putnam, T. J.: Action Potentials of Muscles in "Spastic Conditions," *Arch. Neurol. Psychiat.* 43:1 (Jan.) 1940.
19. Hoefer, P. F. A.: Electromyographic Study of the Motor System in Man, *Monatschr. f. Psychiat. u. Neurol.* 117:241 (April) 1949.
20. Lindsley, D. B.; Scheiner, I. H., and Magoun, H. W.: An Electromyographic Study of Spasticity, *J. Neurophysiol.* 12:197 (May) 1949.
21. Leebourtown, G. N.: Electrophysiological Evaluation of Mechanical Response in Mammalian Skeletal Muscle in Different Conditions, *J. Neurophysiol.* 11:153 (May) 1948.

exception of electromyographic studies during Mephenesin (Myanesin®) administration,⁸⁻²² however, the effect of therapeutic agents on the degree of spasticity was not evaluated.

It was therefore felt desirable to devise a simple procedure for determining quantitatively the resistance that the spastic muscle in hemiplegia offers to extension, and to determine the effect of therapy on the resistance to extension. The method to be described differs from mechanical methods previously used mainly in that the force required to initiate motion is measured, whereas in earlier methods the force required to maintain motion was measured.

Procedure

All studies were made on the elbow flexors, measurements being made of the resistance to extension at the elbow. The "test board" (T in Figure 1) used to determine the resistance of the forearm to extension, was rectangular (60.5 x 37.5 cm.), with a mobile arm board (A) attached to it in such manner that there was a vertical axis of rotation (F) at one end and free motion at the other (W). The patient was seated, with the arm abducted 85 to 90 degrees, and the forearm placed on the mobile arm board (A), with the elbow directly over the axis of rotation (F), and the hand over the freely moving end (W). The forearm was fixed to the arm board by means of straps.

After the patient had been seated for ten to twenty minutes, control readings of the resistance to extension were taken. This procedure consisted of applying a known force at a point 37.5 cm. from the elbow and at right angles to the long axis of the forearm (along line S in Figure 1). Increasing forces were applied until an angular extension of just 1.5 degrees (\ominus) was produced. Three readings of the minimal force required to extend the elbow 1.5 degrees were taken at one-minute intervals every ten minutes, until there was only a slight difference between consecutive ten minute readings. The effect of various procedures on the resistance to extension was then studied.

The following techniques were used:

- Infra-red irradiation of the flexor surface of the arm for thirty minutes with a 250 watt Mazda bulb in a reflector. In some experiments, the bulb was 14 inches from the skin surface while in others it was at a distance of 20 inches from the skin.
- Hot packs applied to the flexor surface of the arm for thirty minutes, changing the packs every five to eight minutes.
- Fifteen layers of hot paraffin brushed on the flexor surface of the arm and then covered with wrapping paper for insulation. This was left on for thirty minutes.
- Tetanzing current to the elbow flexors for ten minutes. Maximally tolerated currents of a continuous sine wave at 60 cps. were used.
- Galvanic current with current intensity of 20 milliamperes applied for thirty minutes. The anode covered the entire elbow flexor area, while the cathode was placed on the back.
- Ethyl chloride spray to the flexor surface of the arm for five minutes. During this period blanching of the skin was produced, followed by erythema when the spray was stopped. The spray was always moved in a cephalad direction.
- Mephenesin (Myanesin®), — a 2 per cent solution of "Tolserol®" * was injected intravenously at a rate of 60 to 80 drops per minute, until 100 to 150 cc. had been given.

Electromyography was done using needle electrodes and either a Grass preamplifier (flat in response from 0.5 to 50 cps.) and Dumont oscillograph or the Meditron unit. The degree of amplification was such that a 10 mm. deflection on the screen of the cathode ray oscillograph was approximately equal to 50 microvolts.

Results

A. In order to evaluate the validity of the method used, three types of experiments were performed. In the first, the normal and the hemiplegic

²² Schlesinger, E. B.: Clinical Applications of Myanesin, Tr. New York Acad. Sc. 11:15 (Nov.) 1948.
* Courtesy of E. R. Squibb & Sons for the purpose of this study.

extremity were compared; in the second, brachial plexus block was performed; and in the third, procedures which were known to produce changes in tone were tested, namely, the tonic neck reflexes.

1. Comparison of normal and spastic extremity (5 observations; 4 hemiplegic patients). The force required to initiate elbow extension was measured at elbow angles of 90 to 150 degrees (figure 2). The resistance to extension was significantly greater in the hemiplegic than in the normal extremity, the difference between the two increasing with the increase in elbow angle.

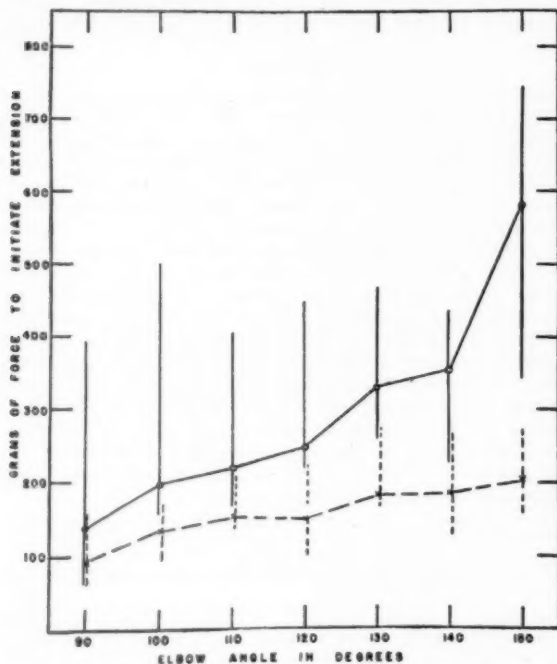


Fig. 2. — Comparison of Resistance Offered to Passive Motion by Normal and Spastic Arms. The curves represent the average of 5 experiments. The ordinate represents the minimal force in grams necessary to passively extend the arm 1.5 degrees. The abscissa represent the initial angle at the elbow at which the grams-resistance was measured. The solid line refers to resistance of the normal arm; the broken line to the spastic arm. The vertical extensions from the mean indicate the range.

2. Brachial plexus block* with 2 per cent procaine (4 observations; 4 hemiplegic patients), effective as determined by sensory and motor examination, resulted in an immediate decrease in the amount of force required to initiate extension. This immediate decrease averaged 47 per cent (figure 3).† The relaxation produced by the block was undiminished for thirty minutes, and then began to decrease. Even at the end of one hour, however, less force was required to extend the forearm than before the block.

3. Tonic Neck Reflexes (7 observations; 5 hemiplegic patients). With the patient in the sitting position, rotation of the head away from the hemiplegic extremity and extension of the head each resulted in consistent and significant increases in the amount of force required to extend the elbow ('p' values of .05—.02 and .01—.001, respectively) whereas head flexion resulted in a significant decrease in the resistance to extension ('p' value <.001). Rotation of the head towards the hemiplegic side resulted in a slight and insignificant increase in resistance to extension ('p' value >.01), (figure 4).

* Courtesy Dr. Robert Virtue, Department of Anesthesiology, Department of Medicine, University of Colorado, Denver.

† The elbow angle used in this and all subsequent observations was 145 degrees.

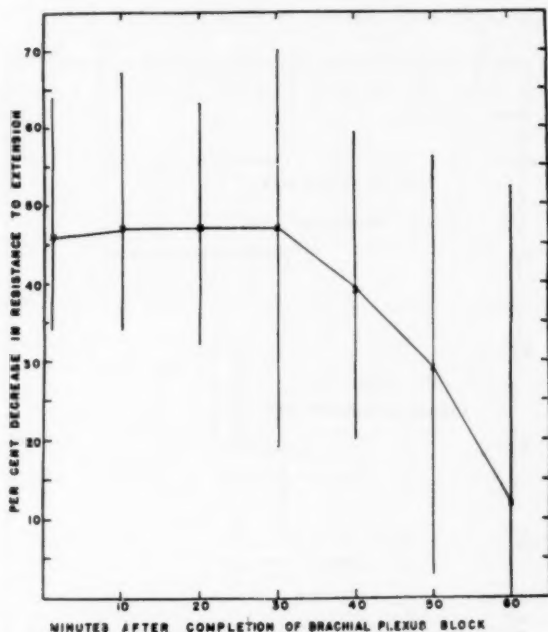


Fig. 2. — Effect of Brachial Plexus Nerve Block on the Resistance Offered by the Spastic Extremity to Passive Extension. The ordinate represents the average per cent decrease in grams-resistance to passive extension of the elbow 1.5 degrees from a starting angle of 145 degrees. The abscissa represents the time after the nerve block. The vertical indicates the range of variation from the mean.

B. Test of therapeutic procedures (Table 1). The only significant changes in the resistance of the forearm to extension followed infrared radiation at a 14 inch source-skin distance, and intravenous injection of Mephenesin (Myanesin®).

The decrease in resistance to extension following infrared radiation at 14 inches is small in amount, but, nevertheless, statistically significant as noted by the 'p' value of the mean per cent change in resistance to motion. In addition, the variability of the control was small; the ratio of the standard deviation to the mean for any one experiment amounting to only 0.03. A 9 per cent change from a mean which has such a small variability is significant. Finally, of the 15 experiments, 11 showed a decrease in resistance to extension following infra-red radiation at 14 inches, 3 showed no change, and only one showed an increase. This average decrease in resistance to extension of 9 per cent was noted immediately after cessation of the infra-red radiation. During the irradiation there was no significant resistance change, while ten minutes after cessation of treatment, resistance values had returned to normal.

Mephenesin (Myanesin®) injection too, significantly decreased the resistance of the forearm to extension. The duration of the injection was forty to sixty minutes. In 4 experiments maximal decrease in resistance occurred ten to twenty minutes after completion of the injection, in 1 ten minutes before termination of the injection and in 1 twenty minutes before the end of injection. The effect of the Myanesin was of longer duration than that

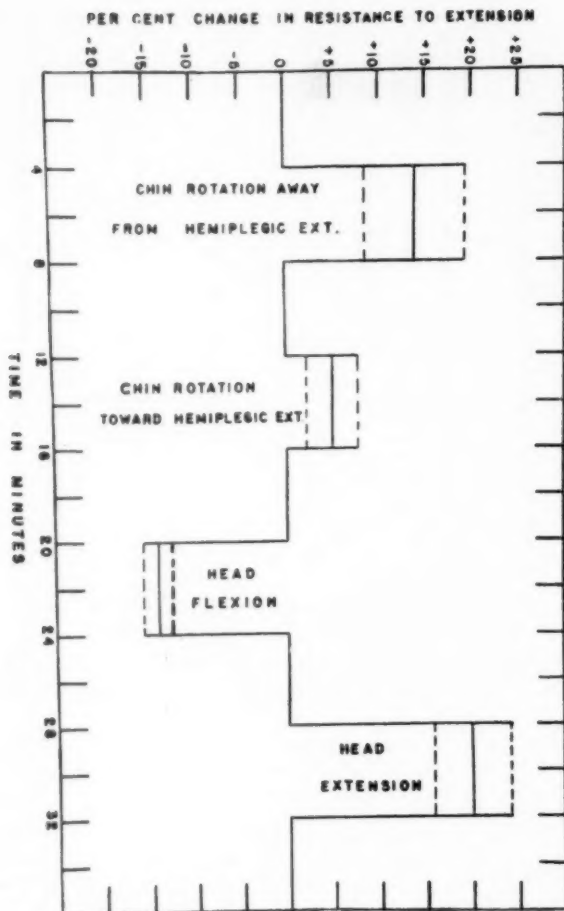


Fig. 4. — Effect of Head Posture on Resistance to Passive Elbow Extension. The ordinate represents the average per cent change in resistance to extension from the resistance present when the head is in the neutral position. The abscissa represent the average time sequence of the experiment and the order in which the head postures were assumed. The broken lines above and below the mean indicate the standard error of the mean.

of the infra-red. Twenty minutes after the maximal resistance decrease of 17 per cent was recorded, the decrease in resistance averaged 13 per cent. Since this was approximately one hundred minutes after the onset of the injection, it was not possible, with the exception of 1 experiment, to keep the subject in one position any longer. In this experiment readings were taken forty minutes after the time of maximal resistance decrease, during which time there was only a slight return towards the normal value.

Blood pressure and pulse rate were followed in 5 of the 6 observations. In none was the pulse rate altered by Myanesin®. In 1 of the 5 there was a slight increase in both systolic and diastolic pressure (116/68 to 138/78),

TABLE 1. — *Effect of Various Procedures on the Resistance Offered by the Arm to Passive Extension of 1.5 Degrees*

| Procedure | Number of Observations | Average Per Cent Change ¹ | S. E. ¹ % | p Value |
|------------------------------|------------------------|--------------------------------------|----------------------|----------|
| Infra-red, 14"² | 15 | -9 | 2.7 | .01—.001 |
| Infra-red, 20"² | 15 | -2 | 2.9 | 0.5 |
| Hot packs³ | 16 | -4 | 3.7 | 0.3 |
| Galvanic current³ | 17 | -1 | 2.7 | 0.7 |
| Tetanzing current³ (60 cps.) | 4 | +6 | 5.2 | 0.3 |
| Ethyl Chloride³ | 4 | +5 | 9.9 | 0.6 |
| Paraffin² | 4 | +4 | 3.8 | 0.4 |
| Myanesin, I. V. | 6 | -17 | 5.5 | .05—.02 |
| Brachial plexus block | 4 | -46 | 11.5 | .05—.02 |

1. Standard error of the mean per cent change.

2. Application to flexor surface of arm.

3. Active electrode over biceps area, inactive to the back.

4. Per cent change in the resistance to passive extension produced by the procedure.

while in the others there was no change. In all subjects there was dizziness, drowsiness, slowing of speech, slow response to command, and horizontal nystagmus. In 4 of the 6 patients there was vertical nystagmus.

C. Electromyographic Studies — A needle electrode (coaxial or single) was placed in the spastic biceps at 2 or 3 different points. In 9 studies on 5 patients no action potentials were elicited when the various head postures were assumed. Coughing or yawning, however, elicited strong action potentials.

TABLE 2. — *Effect of Variations in Degree of Extension and in the Amount of Force Required to Produce Extension on the Appearance of Action Potentials in the Spastic Biceps.*

| Degrees of extension | 1.5 | 3.0 | 4.5 | 6.0 |
|-------------------------------------|-----|-----|-----|-----|
| Grams | | | | |
| Minimal to extend required distance | 0 | 0 | 0 | + |
| 500 | 0 | 0 | 0 | ++ |
| 750 | 0 | ± | + | ++ |
| 1000 | 0 | 0 | ++ | ++ |

Sample Protocol of One Experiment

0 no electromyographic activity.

± occasional transient motor unit potential.

+ motor unit potentials in approximately 50 per cent of the trials.

++ motor unit potentials in almost all trials.

In 12 experiments on 5 hemiplegic patients no electrical activity was noted on 1.5 per cent elbow extension with the minimal forces used in the above study. Further studies were done varying the rate of extension (increasing weights in pan) and the degree of extension. On the average (see protocol of experiment in Table 2) no action potentials could be elicited with 1.5 per cent of extension even with forces up to 1,000 gms. As the degree of extension increased, however, beyond 1.5 degrees C., electrical activity was noted more frequently on stretch. In general, the amount of activity increased with increase in degree and rate of extension.

Discussion

A method has been devised to determine the resistance offered by the spastic arm to extension by measuring the minimal force required to extend the elbow 1.5 degrees from an angle of 145 degrees. For the procedure used to be a valid one, it would have to detect differences in resistance or changes in resistance under conditions in which, from clinical or other evidence, such differences or changes are known to exist. Such a test could exist in comparing the normal and the spastic side, in studying the effect of brachial plexus block, and in determining the effect of the tonic neck reflexes.

Since the test clearly demonstrated the difference between the normal and spastic extremity (Figure 2), showing, in addition, that elbow extension became more difficult as the elbow angle increased, and since it was able to demonstrate the effect of brachial plexus block and change in head position, it was believed that it could also be used to study changes produced by therapeutic procedures.

The effect of head rotation away from the hemiplegic extremity corresponds with previous work on the decerebrate cat²³ and the hemiplegic patient.²⁴⁻²⁷ Head rotation towards the affected side, which has been shown to produce elbow extension, produced no significant change in this study. This may have been due to the relative large extension (145 degrees) used in the initial position.

Results obtained by head flexion and extension, however, seem at first to contradict previously obtained data.²³⁻²⁴ Brain²³ and Simon²⁴ found, however, that when the patient was in the sitting position, neck extension increased flexor tonus and neck flexion decreased it. Our findings are in agreement with these observations.

As far as the effect of therapeutic agents on resistance to passive extension is concerned, it is noted that only infra-red radiation at 14 inches and intravenous Myanesin[®] resulted in statistically significant decreases. Infra-red radiation at 14 inches produced a small, though consistent, average decrease in resistance to extension of 9 per cent. This was not, however, long lasting. Myanesin[®], however, caused a greater decrease in resistance, and one which lasted for a longer period of time. We must emphasize that the failure of the other methods to reduce the resistance of the forearm to extension does not necessarily indicate therapeutic inadequacy.

Although the resting spastic muscle is electrically silent,¹⁵ passive stretch has been found to elicit action potentials.¹⁹⁻²⁰ In view of this observation, it is of interest that, in this study, forces which were sufficient to detect differences between normal and spastic extremities in resistance to passive motion did not elicit any motor unit potentials. Further, this resistance could be increased by head rotation and extension without resulting in the appearance of motor unit action potentials. Yet, quite evidently, the increase in resistance is mediated by the peripheral nerves, since brachial plexus block resulted in an immediate decrease in this resistance.

This study provided no answer to the problem. It may be noted, however, that Gelfan and Bishop²⁸⁻²⁹ have demonstrated submaximal contraction of muscle fibers on direct electrical stimulation and maximal contraction on mechanical stimulation, without the appearance of action potentials. These studies were on the muscle fibers of the retrolingual membrane of the frog.

In addition, it has been shown, by Kuffler and Gerard,³⁰ that, in the frog a small-nerve motor system to skeletal muscle is present, which can cause appreciable tension development in the muscle without motor unit potentials. Small slow potentials changes do, however, exist following stimulation of these small-nerves.

23. Magnus, R.: Some Results of Studies in the Physiology of Posture, *Lancet* 2:531, 585 (Sept. 11, Sept. 18) 1926.

24. Walshe, F. M. R.: On Certain Tonic or Postural Reflexes in Hemiplegia, with Special Reference to the So-called "Associated Movements," *Brain* 46:1 (May) 1923.

25. Brain, W. R.: On the Significance of the Flexor Posture of the Upper Limb in Hemiplegia, with an Account of a Quadrupedal Extensor Reflex, *Brain* 50:113 (June) 1927.

26. Simons, A. von: Kopfhaltung und Muskeltonus, *Zeitschr. f. d. ges. Neurol. u. Psychiat.* 80: 499, 1923.

27. Yarnshon, L. J.; Machek, O., and Covalet, D. A.: The Tonic Neck Reflex in the Hemiplegic, *Arch. Phys. Med.* 30:706 (Nov.) 1949.

28. Gelfan, S., and Bishop, G. H.: Action Potentials from Single Muscle Fibers, *Am. J. Physiol.* 101:1073 (Sept.) 1932.

29. Gelfan, S., and Bishop, G. H.: Conducted Contractures Without Action Potentials in Single Muscle Fibers, *Am. J. Physiol.* 100:237 (Jan.) 1933.

30. Kuffler, S. W., and Gerard, R. W.: The Small-Nerve Motor System to Skeletal Muscle, *J. Neurophysiol.* 10:353 (Nov.) 1947.

These findings merely suggest that, in other species, muscle tension can exist without the appearance of motor unit action potentials. Such observations are not directly transferable to man.

Summary

1. A method to measure quantitatively the degree of resistance offered by an extremity to passive motion has been presented.
2. This method is quantitatively sensitive to differences between the normal and spastic extremity at various degrees of elbow extension as well as to changes produced by the tonic neck reflexes and by brachial plexus block.
3. The effect of eight therapeutic agents on the resistance to passive motion was studied. Only two, near infra-red radiation at 14 inches and intravenous Mephenesin, produced statistically significant decreases in this resistance.
4. Electromyographic studies showed that increased resistance to extension in a spastic muscle could be demonstrated during degrees of extension which did not evoke action potentials. Similarly, changes in position of the head altered the resistance of the extremity to passive motion without producing action potentials.

Discussion

Dr. Bruce B. Grynbaum (New York, N. Y.): I would like to congratulate Dr. La Joie and Gersten on their most interesting presentation. The problem of muscle spasm is of great importance to the physiatrist in his clinical work and has many puzzles for the laboratory worker. The best examples of the controversy on this subject is that the authors carefully avoided the words "spasm" and "spasticity," substituting for them the terms "tightness." Naturally, we cannot speak of spasm or spasticity of normal muscles.

The lack of electromyographic activity was of great interest to me. The authors broach the question as to what degree the measurements were influenced by the elasticity of the muscles. The hemiplegic muscle is probably shorter than the normal muscle and at the same angle would be stretched more — sharp upgrade to terminal extension. The fact that the brachial plexus block affected the results only by 42 per cent should be noted; I should like to hear Dr. LaJoie comment on the possibility that the block decreased elasticity of the muscle and that the remaining 63 per cent of resistance was caused by stretch and tissue elasticity. On the other hand, the differences in measurements produced by neck flexion would favor a neuromotor mechanism. The effect of heat and Mephenesin (Myanesin®) might be either on motor function or elasticity.

I would suggest to the authors a following additional experiment in order to distinguish further between elasticity and motor activity:

1. Comparison of the results from use of larger angles of displacement, e. g., 30 or 40 degrees.

2. Comparison of the differences produced by changes in the speed of displacement.

Dr. LaJoie (closing): In regard to the question of resistance offered being due to elasticity, particularly at the increased angles of elbow extension, I mentioned that the angle course is 145 degrees and that the resistance dropped 47 per cent, and that 47 per cent in the cases we did represented an average, but that in some of the cases the resistance dropped below that of the normal extremity and in other cases it closely approached the resistance offered by normal extremities. We felt that by doing the block we had ruled out the possibility of resistance being due to contractures in the tissue or to elasticity change. As far as the difference in angle displacement and the speed of displacement are concerned, I didn't quite understand what Dr. Grynbaum meant. Did he ask if we studied the resistance at those different angles or the electro myogenic activity? (**Dr. Grynbaum** — Was the resistance measured at different angles of displacement?) **Dr. LaJoie** — No we did not study the resistance. We did study the electromyographic activity and we have stated that as the angle or the acceleration increased the electrical activity increased. The other question that came up was whether our electrodes picked up proper motor unit. This is certainly a serious question as related to this problem; we took many samples of each muscle, repeating the experiment over and over and we used coactional needles, single needle electrodes; we also used skin electrodes. Perhaps we haven't done enough sampling yet, I don't know.

STUDIES OF THE EFFECT OF MASSAGE ON THE FLOW OF LYMPH FROM THE FORELEG OF THE DOG *

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MINNEAPOLIS

The use of massage for its therapeutic effect is one of the oldest of prescribed treatments. However, as is true of many other forms of treatment, the use and value of massage has been based largely upon its clinical results, rather than upon objective physiological evidence of its effects as observed in scientific research. The scientific basis for the use of massage in circulatory disorders is not clearly understood. The benefits to the circulatory of the blood, which were alleged by the older clinicians such as Hoffa¹ in 1900, Rosenthal² in 1910, and Pemberton³ in 1930, have not been borne out by research. Nevertheless, in the hospital massage is observed to hasten healing in areas of impaired circulation. It has been shown in the clinic that massage decreases local blood stasis and reduces edema.³ These effects have been attributed to an increased fluid and food exchange, with improved cellular metabolism.³ It was believed that this was accomplished by the increased external pressure on the tissues and a stripping of the blood and lymphatic vessels of their contents.²

Recent research has not always supported the clinical claims made for massage. Wolfson⁴ in 1931 found, by cannulation of the femoral vein, that during a ten minute period of massage the blood flow increased rapidly. As soon as massage ceased, the flow decreased to the control or less than control rate of flow. There was no prolonged effect on blood flow by massage. Wakim and others⁵ in 1949 found, by measurements with a plethysmograph, that there was no consistent or significant increase in total blood flow after deep stroking or kneading massage of the extremities. Studies done by Drinker and Field⁶ in 1933, and by Drinker and Yoffey⁷ in 1941, on lymphatic flow have shown that upon initiation of massage there is a rapid flow of lymph, which decreases in rate over a ten minute period and ceases almost immediately when the massage is discontinued. From these studies it might be assumed that massage does not have a significant effect on circulation or on cellular metabolism. If this assumption were valid the therapeutic value would not justify the use of massage to aid circulation.

However, clinical experience, although harder to control than laboratory

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* Abridgment of a thesis submitted by Margaret P. Ladd to the faculty of the Graduate School, University of Minnesota, in partial fulfillment of the requirements for the degree of Master of Science in Physical Therapy.

¹ Hoffa, A. J.: *Technik der Massage*, Germany, Stuttgart, F. Enke, 1900. Trans. Bohm and Gould, Philadelphia, W. B. Saunders Company, 1913.

² Rosenthal, C.: *Die Massage und ihre wissenschaftliche Begründung*, Berlin, 1910.

³ (a) Pemberton, R.; Coulter, J. S., and Mock, H. E.: *Massage*, Phys. Ther. Rev. 11:241. (b) Pemberton, R.: *Massage*, J. A. M. A. 94:1989 (June) 1930. (c) Pemberton, R.: *Physiology of Massage*, Handbook of Physical Medicine and Rehabilitation, American Medical Association, Blakiston Company, Philadelphia, 1950.

⁴ Wolfson, K. J.: *Studies on Effect of Physical Therapeutic Procedures on Function and Structure*, J. A. M. A. 96:1919 (June 15) 1931.

⁵ Wakim, K. G.; Martin, G. M.; Terrier, J. C.; Elkins, E. C., and Krusen, F. H.: *Effects of Massage on the Circulation in Normal and Paralyzed Extremities*, Arch. Phys. Med. 30:125, 1949.

⁶ Drinker, C. K., and Field, M. E.: *Lymphatics, Lymph, and Tissue Fluid*, Williams and Wilkins Company, Baltimore, 1933.

⁷ Drinker, C. K., and Yoffey, J. M.: *Lymphatics, Lymph, and Lymphoid Tissue: Their Physiological and Clinical Significance*, Cambridge, Harvard University Press, 1941.

experiments, affords considerable evidence that massage does improve the transport of food and oxygen to the cell and thereby does increase the vitality of the cell. Varicose ulcers produced by venous congestion and edema heal faster when aided by massage. Decubital ulcers and cicatrices of wounds and burns also respond faster when massage is used. Edema from any cause responds to a skillful massage with at least transitory relief. Post-traumatic edema may be decreased by massage and brawny edema minimized. The patient who is inactive because of paralysis or prolonged immobilization develops venous stasis and edema. Massage, employed as a partial substitute for motion in this instance, decreases the stasis of blood, decreases edema, and improves the appearance of the extremity and the comfort of the patient. These are clinical experiments which have been demonstrated repeatedly. The basis of the beneficial effects needs elucidation.

The purpose of this research was to seek the basis for the usefulness of massage in vascular disturbances. The effect of massage on tissue fluid movement and lymph production was studied. Comparison was made of the effects of massage on lymph flow with those of two other common therapeutic modalities — passive motion and muscular contraction as simulated by electrical stimulation.

Methods

Seventeen dogs were used in this study. They were chosen at random from the kennel of stock animals. Anesthesia was established by intravenous administration of pentobarbital sodium, 33 mg/kg of body weight. DuPont's Sky Blue Dye, 1.5 — 2 per cent, was injected subcutaneously between the digits of the forepaw in order to stain the lymph and facilitate cannulation.

A ten centimeter incision was made in the antrolateral aspect of the neck, medial to the lymph gland which collects lymph primarily from the foreleg and the shoulder. The largest of the dye-filled efferent lymph channels from this gland was located by blunt dissection into the deeper structures of the neck. The channel was cannulated by using polyethylene tubing. Lymph was collected in test tubes in which one drop of heparin solution had been placed to prevent clotting.

Each experiment consisted of a sequence of three procedures: massage, passive motion, and electrical stimulation. There was a ten minute equilibrating period before any procedure of the experiment was begun. Each procedure was applied for a ten minute period and was followed by a ten minute control period of complete rest. The volume of lymph collected during each ten minute period, procedure or rest, was measured in a ten cubic centimeter graduate. The experiment was repeated two to four times on each dog. The sequence of procedures was rotated from dog to dog.

For electrical stimulation of the muscles of the leg an electrode of tin, covered with a pad saturated with normal saline, was placed in contact with the skin of the lumbar area where the hair had been clipped. A small electrode of tin measuring 1 x 15 cm., protected on one side by plastic tape, was passed around the brachial plexus. A sixty cycle sinusoidal current was used to stimulate the motor nerves to both the flexor and the extensor muscles of the forelimb intermittently. This gave a static muscular contraction of the entire limb. The duration of stimulation was three seconds and the rest period was two seconds. The effective current for stimulating the brachial plexus was calculated to be 0.05 to 0.7 milliamperes.

Passive motion consisted of alternate flexion and extension of the paw, elbow, and shoulder, following the rhythmic patterns of slow motion running. Massage was carried out, using a modified Hoffa technique. This consisted of three long introductory strokes running from the tip of the paw to and

including the shoulder, followed by ten strokes of effleurage and ten of petrissage, with friction at the joints, progressing from the paw to the shoulder by muscle groups. All strokes were applied in a centripetal manner.

Results

The collection of lymph in these experiments was only semi-quantitative. Only one lymphatic channel of the several that drain the foreleg was cannulated. There was no way of knowing what per cent of the total lymph flow from the foreleg was obtained. However, the area drained from the foreleg of each dog remained the same throughout the various procedures.

TABLE 1. — Comparison of the Effectiveness of Massage, Passive Motion, and Electrical Stimulation in Causing Lymph Flow from the Foreleg of the Dog (15 Animals).

| Procedure | Number of Experiments | Mean Flow (cc./10 Min.) | Standard Deviation* | Standard Error† | Probability‡ |
|------------------------|-----------------------|-------------------------|---------------------|-----------------|--------------|
| Control | 156 | 0.16 | ±.13 | | |
| Massage | 52 | 2.81 | ±1.87 | ±0.26 | <.001 |
| Passive Motion | 52 | 1.78 | ±1.35 | ±0.19 | <.001 |
| Electrical Stimulation | 52 | 0.75 | ±0.90 | ±0.13 | <.100 |

* Standard deviation of the distribution. In the case of electrical stimulation this figure exceeds the mean as the result of skewness.

† Standard error of the mean.

‡ Probability: The figures in this column are the probability that the difference between test and contrast (control) would arise as an accident of sampling.

The value of p (probability that the observed difference between test and contrast would arise as an accident of sampling) was also computed for the differences, (1) between massage and electrical stimulation, (2) between massage and passive motion, and (3) between passive motion and electrical stimulation, and was found to be less than 0.001 in all three cases.

A study made of fifteen dogs as a group showed that the rest period between procedures was an adequate control period (Table 1). The lymph flow during the quiet control period was negligible, averaging 0.162 cc. per ten minutes. A drop or two of lymph usually flowed from the polyethylene tube at the beginning of the control period following activity, and then there was cessation of flow through the remainder of the control period. Activity of any type — massage, passive motion, or electrical stimulation — was accompanied by an increase in lymph flow over that of the control period.

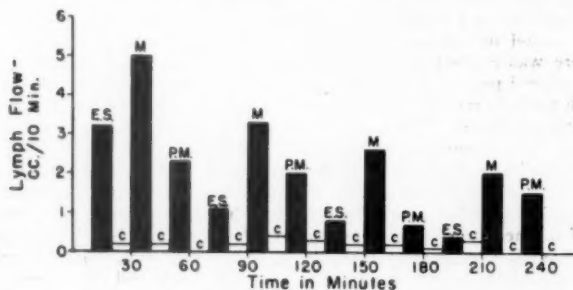


Fig. 1. — Comparison of the effects of massage (M), electrical stimulation (ES), and passive motion (PM) on lymph flow from the forelimb of an anesthetized dog. The procedures were administered in sequence for ten minute periods as indicated, alternated with ten minute control periods (C) of complete inactivity. This experiment is typical of the relative effectiveness of the three procedures for producing lymph.

Massage, as applied in this study, produced the greatest volume of lymph flow. Figure 1 illustrates a typical experiment with the sequence of procedures alternating with quiet control periods. There was usually a progressive decline in the rate of lymph flow throughout the experiment as illustrated

here. In some experiments, after the first sequence of procedures the rates of flow would remain fairly constant for each procedure. Massage usually produced the greatest amount of lymph, followed by passive motion; and electrical stimulation produced the least. There was considerable variation of lymph flow from one dog to the next. Likewise the first sequence of procedure on each dog and usually the first procedure of that sequence produced a much greater lymph flow than any subsequent procedure. Therefore the variability of lymph flow made it impossible to establish the significance of the procedures statistically on some animals. On a series of fifteen dogs similar experiments were run and a statistical study of the effectiveness of massage, passive motion, and electrical stimulation was made (Table 1). Massage caused a mean lymph flow of 2.81 ± 1.87 cc. per 10 minute period. Passive motion produced a lymph flow of 1.78 ± 1.35 cc. per 10 minute period. Electrical stimulation was least effective and showed the greatest relative variability, producing 0.75 ± 0.90 cc. of lymph per 10 minute period.

TABLE 2.—*Analysis of the Rate of Lymph Flow from the Foreleg of the Dogs During Massage, Passive Motion, or Electrical Stimulation When the First Sequence of Procedures Was Excluded. Storage of Water in the Extremity Prior to the Experiment Made the Lymph Flow During the First Sequence of Procedures Much Greater Than During Subsequent Procedures. (15 Animals.)*

| Procedure | Number of Experiments | Mean Flow (cc./10 Min.) | Standard Deviation ^a | Standard Error ^b | Probability ^c |
|------------------------|-----------------------|-------------------------|---------------------------------|-----------------------------|--------------------------|
| Control | 111 | .15 | $\pm .08$ | | |
| Massage | 37 | 2.26 | $\pm .70$ | $\pm .11$ | <.001 |
| Passive Motion | 37 | 1.41 | $\pm .94$ | $\pm .16$ | <.001 |
| Electrical Stimulation | 37 | .55 | $\pm .43$ | $\pm .07$ | <.001 |

^a Standard deviation of the distribution.

^b Standard error of the mean.

^c Probability that the difference between test and contrast would arise as an accident of sampling.

Because the first sequence of procedures always produced a much greater lymph flow than subsequent procedures, the data on the series of 15 dogs was reanalyzed, excluding the first sequence on each dog (Table 2). This decreased the factor of storage of tissue fluid before the experiment began. Massage still produced a lymph flow significantly greater than the other procedures, 2.26 ± 0.70 cc. per 10 minute period. Passive motion, 1.41 ± 0.94 cc. per 10 minute period, produced significantly more lymph than electrical stimulation, 0.55 ± 0.43 cc. per 10 minute period.

Hydration of the animal has been reported to be a factor influencing rate of lymph flow.⁸ All dogs in this series had been given water ad libitum prior to the experiment. There was no other control of hydration from animal to animal. One animal studied appeared to be rather dehydrated. After three sequences of procedures, Ringer's solution was infused into the right jugular vein at 10 cc. per minute (Figure 2). This infusion produced a pronounced increase of lymph flow with each of the procedures studied, although there was no flow during the control periods. This dog was not included in the study group of 15 dogs.

In one experiment it was possible to observe the effect of prolonged shivering on lymph flow. This animal differed from those in the large series in that the common junction of the thoracic duct and the lymphatic to the foreleg was cannulated. Shivering is a form of muscular activity involving alternating contraction of agonists and antagonists with considerable motion over a short range. Shivering was found to be very effective in promoting

8. (a) McCarrell, J. D.: The Influence of Various Factors in the Flow and the Protein Content of Cervical Lymph as Established by a New Quantitative Method for the Measurement of Lymph Flow. Thesis for a Ph.D. degree as submitted to Radcliffe College. (b) McCarrell, J. D.: Effect of Warm and Cold Nasopharyngeal Irrigation on Cervical Lymph Flow, *Am. J. Physiol.* 128:349, 1941.

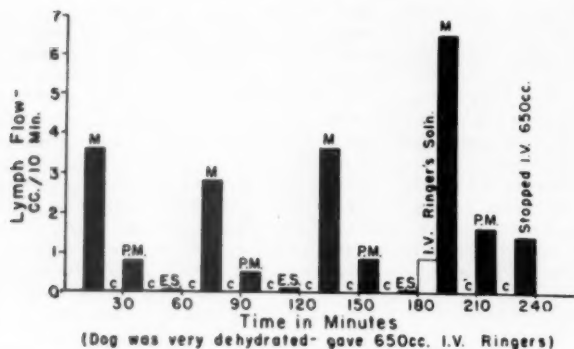


Fig. 2. — The effect of hydration on rate of lymph flow from the forelimb of a dog. After a sequence of massage, passive motion, and electrical stimulation, Ringer's solution was injected into the right external jugular vein at the rate of 10 cc. per minute. During the infusion the lymph flow increased during the procedures but not during the quiet control periods.

the flow of lymph (Figure 3). After the initial procedure — massage — the dog began to shiver and for the next seventy minutes the lymph flow produced by shivering during the "control" periods was in the same range as that produced during passive motion or massage. At ninety minutes shivering was inhibited by warming the animal with a lamp, and the lymph flow decreased. At 130 minutes the animal was cooled again. Violent shivering now caused a rapid flow of lymph, 5.6 cc. in a 10 minute period.

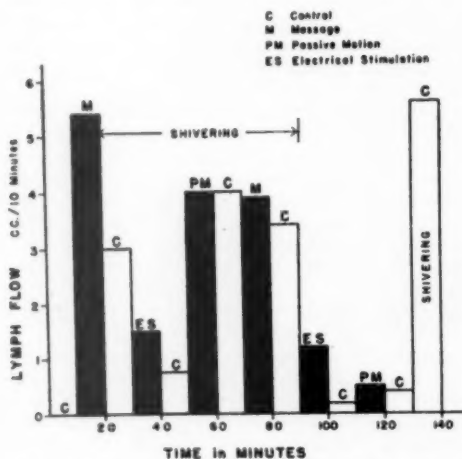


Fig. 3. — The effect of shivering on the rate of lymph flow. The junction of the thoracic duct and the foreleg lymphatic was cannulated. Shivering increased progressively from 20 minutes to 80 minutes. At 80 minutes the animal was heated with a lamp and shivering was inhibited. At 130 minutes the lamp was turned off and violent shivering occurred.

Comment

This study was undertaken to attempt evaluation of massage as a therapeutic tool in promoting lymph flow and decreasing interstitial edema. There are certain inherent difficulties in studying lymph flow. Lymph channels are small, numerous, and irregular in position. It is not possible, as in studying circulation of the blood, to cannulate one large vessel and measure flow from a leg. It is not even certain that from one animal to the next the same lymphatic vessels will occur in the same location with drainage from the same area. Nevertheless, it was possible to get a semi-quantitative measure of lymphatic flow from the foreleg of the dog in response to various procedures studied. For each animal it is probable that the area of lymphatic drainage remained constant throughout the experiment, so that one procedure may be compared to the others. However, from animal to animal the area of the forelimb from which lymph was collected may have varied considerably. Injection of dye into the forepaw assured that the lymphatic vessel cannulated collected a proportion of the lymphatic flow from the paw. Usually only one dye-filled lymphatic channel was seen leaving the large lymph node above the shoulder. This would support the belief that most of the lymphatic flow from the paw was collected through the cannulated lymphatic vessel.

Lymph is formed from extravascular fluid and contains the same compounds as found in extravascular fluid: water, electrolytes, protein, and metabolites. The lymphatic capillaries are incomplete endothelial tubes originating in the tissue spaces. Tissue fluid flows passively from the extravascular spaces into these incomplete lymphatic capillaries, depending on the pressure gradient. The direction of the pressure gradient determines the direction of flow. Protein can move as freely in this gradient as can smaller crystalloids. As fluid flows along the lymphatic capillary, and walls pass by transition to complete endothelial tubules and later to endothelium surrounded by connective tissue when the lymphatic collecting vessels are reached. In the lymphatic vessels, endothelial valves are found which prevent back flow of fluid; consequently, a one-way conduction system is set up. Water and crystalloids will filter through the walls of the lymphatic tubules if the intra-lymphatic pressure is raised, while protein is retained. Because of this, the protein content of the lymphatics rises slowly from the lymphatic capillaries to the large lymphatic vessels. The rate of flow of lymph along a lymphatic vessel depends on intermittent external pressure on the vessel, producing a pressure gradient. Therefore, the rate of lymph flow will be dependent partially on the rate of alternation of external pressure on the tissue spaces and lymphatics, and the direction of progression of the pressure gradient. Because the network of lymphatics is very extensive, the direction or application of pressure is a less important factor than the rate of alternation of pressure. Nevertheless, it appears that a pressure progressing centripetally along a lymphatic vessel will strip successive compartments in the lymphatics and cause a more rapid rate of flow than irregularly applied pressure.

Carefully applied massage appears to be one of the most favorable means of exerting the external pressure necessary to cause lymph to flow. Progression of the pressure gradient from the tissue spaces to the lymphatic capillaries and then progressively along the lymphatics effectively strips the lymph from the vessels. Although this theoretical value of massage has been recognized for many years, the relative effectiveness of massage, passive motion, and active muscular contraction has been questioned. It was interesting therefore, to observe that under the conditions of the experiment there was a demonstrable difference in the rate of lymph flow when massage

was used as a means of promoting flow as compared to passive motion or muscular contraction. That there would be this clear cut advantage of massage over other means of producing lymph flow had not been anticipated when this series of experiments were begun. Nevertheless, the differences in the effect of massage, passive motion, and electrical stimulation in causing muscular contraction, on this series of dogs, was unmistakable.

It has been recognized for many years that muscular contraction is an excellent way to cause lymph to flow. White, Drinker, and Field⁹ showed that lymph flowed from the paw of the dog during walking or running at a relatively rapid rate. The action of "auto-massage" on the lymphatics by the muscles is recognized clinically as being the normal mechanism for promoting the flow of lymph. Clinically the question can be raised, "Is the artificial method of promoting lymph flow by massage as effective as normal 'auto-massage'?" It is obvious that the rate of lymph flow will vary with the type of muscular activity. Slow or sustained contractions of muscles will have a far different influence than repeated contractions of short duration. Likewise, muscle setting, in which there is little movement of the joint or shortening of the muscle, may have an entirely different effect than full contraction and extension of the muscle, which would exert considerable lateral pressure on the lymphatics. In addition, the motion of the joint with stretching and compression of the periarticular soft tissue will be a factor in the various types of muscular activity. It was obvious from this study that the isometric type of contraction was not nearly as effective as the muscular activity during shivering where there is alternating contraction and relaxation of the muscle, even through a relatively short range. Other types of muscular activity might be found to be still more effective in promoting the flow of lymph. Nevertheless, it is of interest to observe that isometric muscular contractions were not as effective in promoting lymph flow as was a systematic manual massage.

The usefulness of massage, observed clinically in circulatory diseases, may have as its basis the effects demonstrated here. The total circulation from a functional point of view must include the transportation of food materials from the alimentary tract and oxygen from the lungs through the blood vessels, across the capillary wall, through the intercellular space, and to the cell. Likewise, metabolic products must be returned from the cell, across the intercellular space, to the capillary, and back through the blood circulation to the excretory organs. Because of its discreteness, we often are inclined to think of the hemal circulation as the total circulation and end our considerations of transport of materials at the capillary. In the metabolic circulation, the hemal circulation constitutes only a part of the supply system. When there is a disturbance in the extravascular circulation, particularly when there is edema, true metabolic circulation time to the cell is greatly prolonged. Under normal circumstances, the extravascular distance from the capillary to the cell is relatively small and diffusion can occur across it at a rapid rate. If there is increased extravascular fluid, the distance from capillary to cell is increased, and diffusion time for materials increases as the square of the distance. Consequently, edema becomes an important factor in slowing down metabolic circulation. As the edema increases, the rate of transport of food and oxygen to the cell becomes increasingly slower and less adequate to meet the metabolic demands. At some point the edema will become so great that normal metabolism is not possible. Then atrophy or death and destruction of the cell must occur. When

⁹ White, J. C.; Drinker, C. K., and Field, M. D.: On the Protein Content of Normal Flow of Lymph from the Foot of the Dog, *Am. J. Physiol.* 103:34, 1922.

disturbances of the hemal circulation are added to disturbances of the extravascular circulation, this circulatory insufficiency is aggravated.

The lymphatic system plays an important role in maintaining the balance of circulatory exchange across the capillary wall. Although the total filtration and reabsorption of water at the capillary is great, the net exchange is relatively small. However, if there is a persistent excess of filtration over reabsorption, edema will occur. Likewise, the slow leak of proteins through the capillary wall will raise the protein concentration in the tissue spaces to that of the plasma if there is no mechanism for removal of these plasma proteins. Consequently, the lymphatic circulation plays an important role in draining off excess fluid filtered through the capillary wall and in providing a path for removal of proteins which have leaked across the capillary membrane. Under conditions in which the lymphatic circulation plays its normal role, the total circulation is adequate to meet the metabolic demands. On the other hand, if there is obstruction of the lymphatic circulation or if no external forces are applied to produce a flow of lymph, there is lymphatic stasis with progressive accumulation of water, crystalloids, and protein in the tissue spaces. Under these circumstances, the impairment of cellular metabolism, with which we are familiar in the clinic, occurs. Promotion of lymphatic flow by external mechanical pressures will decrease the accumulated tissue fluid, shorten the distance for diffusion from capillary to cell, improve cellular metabolism, and allow healing to occur at a more normal rate. The effect of massage on lymph flow may explain its value in conditions of stasis edema, with or without impairment of the hemal circulation. Indolent ulcers, stasis ulcers, and decubital ulcers all occur under conditions in which the metabolic circulation is impaired either in its hemal component or its extravascular component or both. Disturbances both within and without the hemal circulation may be of such magnitude that they prevent normal cell metabolism and lead to ulcer formation. For effective healing to occur, it is necessary to correct the deficiency in the metabolic circulation. Where the problem is one primarily of an extravascular disturbance with an increased distance for diffusion from the capillary to the cell, measures which are aimed at increasing circulation through the capillaries will not be completely effective in relieving the condition. On the other hand, simple measures which are effective in decreasing edema and promoting lymph flow will increase the transport of food to the cells and metabolites from the cells and allow healing to occur at a rapid rate. The demonstration here that massage is an effective method of promoting lymph flow and thereby decreasing interstitial fluid and increasing extravascular transport emphasizes the importance of its use clinically in cases of circulatory or metabolic disturbances with edema.

Summary

Studies were carried out on dogs of the effectiveness of systematic massage, passive motion, and electrical stimulation, producing simultaneous contraction of agonist and antagonist muscles, on the rate of lymph flow from the forelimb. A polyethylene tubing cannula was inserted into a large lymphatic vessel above the shoulder of the dog, and lymph was collected during control periods and the listed procedures. On a series of fifteen dogs, all three procedures were found to greatly increase lymph flow above that of the control period. Massage was found to be significantly more effective than either passive motion or electrical stimulation in this series of animals. Alternating contraction of flexors and extensors as demonstrated by shivering was found to be a very effective method of promoting lymph flow. Saline infusion increased the rate of production of lymph. The clinical implication of these procedures was discussed.

Discussion

Dr. Frederic J. Kottke (Minneapolis, Minnesota): May I make one comment to emphasize the discussion? This session this morning is very interesting, because in his introduction Dr. Behrend pinpointed the problem that was raised by the Mayo Clinic group when they pointed out that there was essentially no increase in the flow of blood when we massaged an extremity.

Actually, what they studied, if we can diagram it, was the circulation of blood through the vein, and consequently the circulation through the capillary and the artery. They found that massage as carried on in American practice did not increase materially the flow of blood in this area. A number of people said, therefore, that "massage has no mechanical effect on circulation, period; we will not use it any more." Actually, that has been accepted in some places.

One thing that was forgotten, and the thing that stimulated us in beginning this experiment, was this comment that massage has no effect on circulation. We forget that the circulation of the blood — the circulation, for instance, described by Harvey — is not the true metabolic circulation. We have a cell out here somewhere that requires oxygen, glucose, and other food products which produce metabolites, and these materials come down through the blood to the capillary. Then they cross the capillary membrane by filtration, and must diffuse across this interstitial space to the cell.

If this space is increased the diffusion time is increased. Usually this space is relatively small, and diffusion across this space is practically as rapid as the circulation of the material to the capillary, so we have no disturbance.

But as the intercellular space is doubled, the diffusion time is increased as the square of the distance. Therefore, if we double this space we increase the time necessary for transporting the materials by 4. If we treble it we increase it by 9, and so on.

It is very obvious that when we have edema there is marked impairment of the circulation outside of the blood from the capillary to the cell; thus when we have conditions of edema we find clinically, by observation, that there is an impaired metabolism, and that that edematous tissue

breaks down more readily than the non-edematous tissue.

We have a mechanism for a reserve mechanism to carry off this edema fluid if it cannot go back through the vein, and that is the lymphatics. We were studying today the effect of these methods on moving extracellular, extravascular fluid into the lymphatics and through the lymphatics, and I was actually very much surprised to find out that massage actually will promote lymph flow better than passive motion or electrical stimulation that causes muscle contraction.

I am sure I can produce types of muscular contraction that will be as effective as massage; but we were pleasantly surprised to find out how effective massage was in promoting lymph flow, which means the removal of the fluid and the decrease of the extravascular space so that the total time of metabolic circulation (if we may use that term for lack of a better one — the movement of materials through the blood, through the extracellular space, back to the blood and out through the venous circulation) is actually decreased following massage in conditions when we have edema or increased tissue fluid.

Dr. L. B. Newman (Hines, Illinois): I would like to raise several questions with reference to the research done by the essayists. Was the circulation in the dogs normal? If not, was any edema produced before the studies were initiated? Was the resulting data secured only in dogs with normal circulation, or was some study done on the effect of massage in pathologic conditions such as fractures, neuromuscular involvement, etc.?

Margaret P. Ladd (Minneapolis, Minnesota): They were normal dogs, as far as we could tell. They appeared normal; their blood pressure was normal; their color was normal, and they were not "picked" in any way. They were simply taken from the kennel as the caretaker gave them to us. All of them weighed from 25 to 50 pounds. We did not give them any additional fluid.

Newman: Was there any edema in the extremity of any of these dogs?

Ladd: No. We used between 5 and 10 cc. of dye in the paw about 1 hour before tests were begun. There was no appreciable edema that we noticed.



VOCATIONAL TESTING IN EDUCATIONAL THERAPY *

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Introduction

The educational therapy section at the Chillicothe hospital is conducting a vocational testing program which appears to be performing a definite service for the veteran. In addition to assisting the ex-GI in the selection of a suitable vocation, the testing program helps to integrate activities of the different departments which contribute to his rehabilitation. By doing this, the program promises to be another means of speeding up treatment and getting the veteran back on his feet as an effective member of society as soon as possible.

For the past two years the educational therapy section has been interviewing, testing, and submitting vocational interest reports on incoming veterans. Thus far over 600 veterans have been given occupational interest inventories.¹ Those who took the inventories ranged in ages from twenty-one to sixty-six. None was excluded because of type of diagnosis. Those who did not take the inventories did not desire to take them, or were absent from the ward and could not easily be contacted when the inventories were given. The group which took the inventories was composed of all types of male neuropsychiatric patients.

Theoretical Implications

To help the veteran to help himself, so that he may become a self-supporting member of society, is the underlying purpose of the testing program. In attempting to accomplish this purpose, the educational therapist is confronted by a number of problems which are familiar to those who have worked with the mentally ill.

One of the chief problems is that of getting the patient to make a realistic appraisal of his occupational potentialities. Although many patients manifest interest in constructing vocational plans, their plans are often nebulous and impracticable. Instead of pointing to occupational adjustment after release, their objectives are often indices of continued maladjustment.

Some aspire to goals beyond their capacity. Here, for example, is a patient of low-average intelligence who desires to become a lawyer. Here is another who is anxious to work as a special agent for the FBI. Another is convinced that he can contribute to his country's welfare by helping Mr. Einstein create an H-bomb.

* Reviewed in the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the authors are the result of their own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

1. The instruments used in this exploratory study of the vocational interests of male neuropsychiatric veterans were the intermediate and advanced series of the *Occupational Interest Inventory* devised by Edwin A. Lee and Louis P. Thorpe, California Test Bureau, Los Angeles, California, 1943.

The educational therapist cooperates with the vocational rehabilitation and educational advisers in attempting to substitute habits of rational thinking for habits of wishful thinking. Slowly the patient may be led to see that more good things in life can be secured from pursuing suitable objectives than from yearning for the impossible. Slowly he may come to see that as a member of society his social and economic effectiveness will depend to a considerable extent upon his wishful thinking's being supplanted by vocational plans that can be translated into practice.

In contrast to the patient who aspires to goals beyond his capacity, there is the individual who seemingly has no aspirations at all. The emotionally depressed patient often falls into this category. He often underestimates his ability, believing himself to be wholly worthless. Others, having retreated from reality, say that they are not interested in any type of work, that they merely wish to be left alone. Some, of course, admit that work has its good points but insist that they are so discriminated against by society that their chances of securing employment are nil.

It is the problem of the educational therapist to assist in altering such indifferent and negative ideas and to stimulate development of more positive attitudes. To motivate patients, to get them to take an interest in their vocational future, special appeals often have to be made; for many patients do not possess normal drives to action. Some have been disappointed and frustrated to a point where one thing appears as good as another — or where everything appears equally futile. But even for these there are possible sources of motivation, which the competent therapist is ever on the alert to discover.

Administering the Test

Shortly after a veteran is admitted to the hospital, he is interviewed by an educational therapist. He is encouraged to talk about his occupational experiences, about the problems he has encountered in his work, and about his vocational plans and ultimate objectives.

He is then invited to take an occupational interest inventory, the purposes of which are fully explained to him. He is told that it will help him to gain a clearer understanding of the type of occupation from which it is possible for him to achieve the most satisfaction. He is told that the results of the completed inventory will help the physician and the physical medicine rehabilitation chief to plan an individualized hospital program that is in line with his occupational interests. He is told that this information also will assist the different therapists in placing him in suitable activities as quickly as possible. He is told that the vocational rehabilitation and education advisers often use the inventory data in securing the approval for on-the-job training and in placing veterans in appropriate occupations at which they can earn a living after being discharged from the hospital.

Some veterans, of course, are not sufficiently in contact with reality to understand or to appreciate the use of the inventory. Some, who have only a partial understanding of its purpose, object on the ground that they have already been tested enough, or that such devices are just so much "bunk." Some are suspicious of the purpose for which the inventory is to be used, declining to take it for fear that the results will be used to keep them incarcerated.

No forceful tactics are employed to persuade the veteran to take the inventory. It must be taken voluntarily to achieve the most valid results, and to represent the patient's genuine interests.

Few of the veterans who have thus far taken the inventory have ex-

pressed disagreement with the findings. Some, as might be expected, have told the therapist: "The test tells me nothing I didn't know. I knew what my interests were before I took it." Others, however, seem to feel that the inventory has assisted them in clarification of their interests. Many seem to share the view expressed by one veteran: "I've been all bewildered and confused; but this sort of thing helps me to gain a clearer idea of what I want to do in life."

In some cases the findings tend to enhance the patient's self-esteem. Seeing the test results, he feels not only that he has discovered specific practical interests, but that he has had an active hand in their definition and organization. He feels that he, as an individual, has accomplished something toward the integration of his own personality. This gives him a measure of confidence. With the help of the therapist, he can see that further accomplishments are possible.

The therapist attempts to make clear to the veteran that interest is only one of several factors to be considered in vocational planning. He is told that data from the inventory should be supplemented by information from other sources. It is emphasized that his general physical condition should be considered; that specific aptitudes should be taken into account; that educational background and the possibilities for further training should not be overlooked; and further that in choosing a vocation it is well to consider the opportunities for employment as well as interest in the work.

Importance of Early Testing

The value of the testing program depends to a large extent upon the therapist's interviewing and testing the veteran *soon after he is admitted to the hospital*. There are advantages in getting the treatment program underway as soon as possible. When the veteran arrives, he is in an unfamiliar situation. The first impression he forms of the hospital is likely to be a lasting one. To secure from him the maximum cooperation, he must be shown when he first arrives that his new abode is not a prison but a hospital. To get the veteran into a frame of mind receptive to the idea of treatment, he must be shown from the start that he is here to be helped — not only physically but also in regard to social, educational, and vocational problems, which are often at the root of his troubles.

Many veterans would probably not receive the appropriate therapy, or their treatment would be indefinitely postponed, if they were not interviewed soon after admission. Some, feeling that they are deriving no benefit from hospitalization, check out against medical advice. Others simply go "absent without leave." Many of these who leave after a few weeks will later apply for readmission or will be returned by court order. Additional expense, as well as delay in rehabilitation, results from their having failed to remain at the hospital until maximum benefits were attained.

The educational testing program, in conjunction with the other physical medicine rehabilitation activities, helps the veteran to realize that he is being assisted toward the desired goal. This realization promotes greater cooperation between the veteran and the hospital staff, thus shortening the total time and reducing the expense of rehabilitation.

Another advantage in early interviewing and testing is that this procedure enables the therapist to secure information which can be used to advantage during the early stages of the rehabilitation program. Within a day or two after a veteran arrives, the information is typed and sent to the physician who is in charge of the veteran's treatment. Receiving the report before

the patient leaves the admission building, the ward physician has an opportunity to look it over prior to interviewing the patient. This practice assists the physician in gaining a more thorough understanding of the veteran's problems. It also assists in screening out for immediate treatment the veterans most in need of attention.

Copies of the report are sent to the physical medicine rehabilitation chief and to the vocational rehabilitation and education adviser. Another copy is retained in the education section. Until more complete information from other sources has been compiled in the veteran's folder, this report serves a definite need. During the first few weeks of the veteran's treatment it is often the only source of useful information conveniently accessible to all personnel who are concerned with planning and carrying out the rehabilitation program.

The report, in addition to including a summary of the inventory findings, contains a brief statement of the veteran's educational background, his vocational experience, his plans and objectives and a description of any outstanding problems which he has had in regard to occupational adjustment. The interviewer gives his general impression of the patient, describing the extent to which the patient was cooperative and indicating his general attitude. Suggestions are also made as to activities in which the patient might be interested.

These reports, usually not over a page in length, enable hospital personnel to become better acquainted with the veteran's problems and interests, an understanding of which is requisite in placing the veteran in suitable activities as quickly as possible. This procedure reduces to a minimum the lethargy and resulting deterioration commonly experienced during periods of inactivity.

At the suggestion of a ward physician, the report has been extended to include a paragraph concerning the patient's interpretation of his own difficulties. It was suggested that we include information which might indicate the degree of insight possessed by the patient, or which might have diagnostic value.

Occasionally the patient discusses with the therapist certain important problems which he withholds from the physician. Such information, as nearly as possible in the patient's own words, is included in the report and often helps the physician to gain a broader understanding of the veteran's difficulties.

Apart from whatever use the inventory may have as a device for revealing vocational interests, it possesses value as an instrument for establishing rapport and drawing out the patient. It is one method of inducing the veteran to talk about his preferences, his experiences, his problems. While discussing his work, he often reveals information about his mental condition which he would not divulge if questioned directly on the subject.

This information, gained from a non-medical interview, may be of value to the physician. The vocational problems which the patient discloses are often indicative of deeper and more pervasive problems. He sometimes attempts to cover up his main problems by exaggerating his vocational difficulties. Such exaggerations provide the physician with clues as to the real nature of the patient's difficulties.

Then, too, while the patient is discussing his vocational problems, he not infrequently comes to observe his own difficulties more objectively. By talking about his problems he is able to get them out into the open where, to some extent, he can see them as other people do. In doing this he may discover that the deeper and more durable satisfactions of life are not to be found in

infantilism and escape from growth but in development through education toward social and vocational adjustment.

Inasmuch as the vocational testing program is only a part of the treatment received by the veteran, it would be difficult to determine precisely what it contributes to total rehabilitation. Yet it is encouraging to note that practically all the veterans seem to appreciate having an opportunity to discuss their vocational problems and to take the occupational inventory. And it is encouraging to note that the ward physicians have commended the educational therapy section for the results thus far attained.

Results

Of 600 veterans who have taken the occupational interest inventories, 400 have taken the intermediate form and 200 the advanced form. The intermediate form was given to those who had not completed high school, the advanced form to those who had. A comparison of the results obtained from the two groups revealed no significant differences except a higher level of interest in the advanced group. That is, the high school graduates tended to be more ambitious than those who had not graduated from high school.

Significant differences are revealed when the results obtained by the neuropsychiatric veterans are compared with those obtained by non-hospitalized veterans.² The former attained higher scores in the personal-social and natural fields than did any of the other veteran groups. The personal-social field includes interests which involve association with or service to individuals or groups of individuals — such as domestic service, social service, teaching, law and law enforcement, and health and medical service. The natural field includes agriculture and work related to utilization and protection of natural resources. In the field of science the neuropsychiatric veterans attained the lowest score. They also had a lower level of interest than any of the other groups, indicating a tendency to prefer jobs of a simple, routine, unskilled nature.

The high rank which the neuropsychiatric veterans attained in the personal-social field does not necessarily indicate that a large number of neuropsychiatric veterans are peculiarly adapted to personal-social occupations, or that they have a better-than-average chance of succeeding in them. It may indicate that the veterans are attempting to compensate for a lack of satisfactory social relationships. In choosing the personal-social occupations, they may be expressing the loneliness and isolation which they have experienced in consequence of the disruptive influences of war. No doubt there are other factors which have a bearing on the choices they made; but whatever the causes for such preferences, the fact remains that a large number of neuropsychiatric veterans seem to crave occupations which involve associating with and serving other people.

Yet the California Test of Personality, the Bell Adjustment Inventory, and the Bernreuter Personality Inventory point to the conclusion that many of these same veterans feel socially inadequate, dependent, and unable to compete successfully with other individuals. This feeling of inadequacy seems to be reflected in the large number of items selected in the natural field (farming, fishing, forestry, and other outdoor work). The competition in this field is perhaps less pronounced and duties less exacting than in, say, the field of science, in which the neuropsychiatric veterans attained the lowest percentile rank of any group. The fact that their level of interests is lower

2. Data concerning non-hospitalized veterans — in Los Angeles, San Francisco, Brown University, and rural areas — were received in letter dated March 15, 1950, from the California Test Bureau, Los Angeles, California.

than that of the other groups suggests that the neuropsychiatric veterans, feeling inadequate as they do, tend to select occupations which are below average in difficulty.

This tendency may be due in part to the fact that during the war years many of the veterans were deprived of the normal educational and socializing influences. They were taught how to fight but not how to enter into satisfying occupational and social relationships. They were taught how to take orders but not how to assume the responsibilities of family and community life. It is not surprising, therefore, that many of them returned from the service unable to adjust satisfactorily to the problems of everyday living.

Summary

One of the chief problems at a neuropsychiatric hospital is that of getting the patient to make a realistic appraisal of his occupational potentialities. Progress in this direction is being made through administering occupational interest inventories to all types of mental patients.

The value of the program seems greater when interviewing and testing are accomplished on the admission ward as soon as possible after the patient is admitted to the hospital. Early testing puts the patient in a frame of mind receptive to treatment, and provides information which can be used to integrate the activities of the different departments during the early stages of the rehabilitation program.

When a patient is discussing his occupational problems, he often reveals information about his mental condition which he would not divulge if questioned directly on the subject. Such information is of value to the ward physician and other personnel.

The findings of the survey indicate that many neuropsychiatric veterans prefer occupations which are below average in difficulty and which involve associating with or serving other people. Such preferences, it is believed, are due to the veteran's feeling lonely, dependent, and inferior — as a result of the disruptive influences of war.

To assist in overcoming these feelings of inadequacy, the educational therapy section and other services of the Veterans Administration hospital offers friendly and sympathetic advice, and extends to the veteran opportunities for social and vocational education which he missed while serving in the armed forces.



ARCHIVES of PHYSICAL MEDICINE

OFFICIAL PUBLICATION AMERICAN CONGRESS OF PHYSICAL MEDICINE

.. EDITORIALS ..

THE THIRTIETH ANNUAL CONGRESS

The recent meeting of the Congress in New York was a noteworthy one for many reasons. To begin with it was our thirtieth anniversary and in keeping with the rapid growth in our specialty we again changed our name, we hope for the last time, to the *American Congress of Physical Medicine and Rehabilitation*. The ARCHIVES will also follow suit and we now have our American Medical Association section, our specialty board, Society, Journal and Congress all in agreement as to nomenclature. The vote was unanimous and without discussion as contrasted with former heated arguments pro and con.

As might be expected a highlight of the occasion was the presidential address by Robert L. Bennett. He discussed the timely and important subject that of the training of the specialist in our field. As Secretary of the American Board of Physical Medicine and Rehabilitation he is in an authoritative position to give us the true facts at this time. His address which is the lead article of this issue should be studied by all concerned with training residents and also it is hoped by all concerned with interesting talented young doctors in our specialty.

The second John Stanley Coulter memorial lecture was another important event of our thirtieth Congress. All who were fortunate enough to know Doctor Coulter would have realized what great pride he would take in our specialty in its latest development, that of the meeting of our International Congress of Physical Medicine in London in July. No one but his beloved friend Frank Krusen could have made such a masterly and interesting presentation of the events celebrating this occasion. His numerous lantern slides helped us visualize and remember this historic meeting. All those who missed this address will want to read about it in the ARCHIVES.

As usual one of the most exciting moments of the Congress was the announcement of the winners of the Gold Key Awards at the Banquet. This year the choice of the Committee and a most popular one, was that of Mr. Basil O'Connor, president of the National Foundation for Infantile Paralysis for the past fifteen years. His interest in and work for the development of Physical Medicine and Rehabilitation as it relates to the patient with poliomyelitis and also the specialty as a whole is well known to us and we are all grateful for his support over the years and for his keen interest in its continuing growth. Those who were privileged to listen to his speech, the feature attraction of the banquet, were tremendously impressed by his intimate knowledge of some of the problems which confront us in trying to make it possible to supply adequate physical medicine and rehabilitation services to those needing it, particularly those with muscular weakness from poliomye-

litis. Our readers are all invited to share in this inspiring address by reading it on the pages of the ARCHIVES.

The scientific program as intended for a very diversified audience contained papers covering multiple aspects of our broad field. These included clinical papers summarizing present methods of treatment intended for the general practitioner, laboratory studies particularly in relation to ultrasound for the men in research, and numerous accounts of new techniques of value in Physical Medicine and Rehabilitation procedures. The program committee regretted that the number of papers presented had to be curtailed in keeping with the vote of the Congress in Denver and recommended that we again return to the policy of double sessions in the mornings.

The educational conference and instructional courses under the able leadership of Earl Elkins again featured a galaxy of talented lecturers. It is to be hoped that much of this material will become available to the readers of the ARCHIVES in future issues. Another valuable educational project was the assembly of scientific exhibits which again were excellent. The list of winners appears elsewhere in this issue.

In looking to the future we are glad that we have such a strong president in Walter Solomon to carry on in Doctor Bennett's footsteps. Many of the members have been thinking of means to strengthen the organization particularly in reference to making the Congress a truly specialty group without giving up its role of educating the general surgeon and physician in utilization of physical medicine in his practice. The executive council discussed this topic but it has not as yet been brought to the attention of the membership. One suggestion worthy of further consideration is that the voting membership be limited to certificates of the American Board of Physical Medicine and Rehabilitation who would be known as Fellows of the Congress. Membership requirements for others would remain as at present. The fellows would in effect be also the members of the present American Society of Physical Medicine and Rehabilitation and would govern the policies and actions of the Congress. Under existing rules others outside of the specialty often consider membership in the Congress practically the same as qualification as a recognized physiatrist although there is nothing in our membership requirements to justify this. After careful consideration during the coming year it may be possible to take some action at the next Congress meeting to further strengthen our standing even though it requires another constitutional amendment.

Again all best wishes for success to our incoming president, Walter Solomon, during our thirty-first year.

AWARD OF MERIT BY THE AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION FOR THE YEAR 1952

The Committee on Gold Key Awards announced through its Chairman, Dr. Gordon M. Martin, the following recipient:

BASIL O'CONNOR, New York City, in recognition of his contribution to the advancement of the science and art of Physical Medicine by tireless efforts to ensure the best possible treatment for the rehabilitation of victims of poliomyelitis throughout the world and by continuing support of research and education of which the ultimate goal is the eradication of the crippling effects of the disease.

AWARDS TO SCIENTIFIC EXHIBITORS

The Committee on Awards for Scientific Exhibits presented through its Chairman, Dr. William H. Schmidt, the following:

Gold Medal to Robert Denton, 1st Lt., USAF (MC), and Joseph N. Schaeffer, Lt. Col., USAF (MC), for the exhibit, "Continuous Oxygen-Rich Aerosol for the Tracheotomized Respirator Patient."

Silver Medal to William G. Kubicek, Ph.D., and Frederic J. Kottke, M.D., for the exhibit, "Gas Flow Rates During Respiration."

Bronze Medal to Robert C. Darling, M.D., and Edward E. Gordon, M.D., for the exhibit, "Integrated Rehabilitation Services at the Institute for the Crippled and Disabled."

Honorable Mention to John H. Kuitert, 1st Lt. Col. (MC), for his exhibit, "Prosthetic Training for the Upper Extremity Amputee: Special Problems, for Cincplasty," and to Eugene Neuwirth, M.D., for his exhibit "Table for Vertebral Elongation."

MEDICAL NEWS

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least three weeks before the date of meeting.

American Congress of Physical Medicine and Rehabilitation Officers 1953

Walter M. Solomon, M.D., Cleveland, Ohio, President.

William B. Snow, M.D., New York, N. Y., President-Elect.

William D. Paul, M.D., Iowa City, Iowa, First Vice-President.

Howard A. Rusk, M.D., New York, N. Y., Second Vice-President.

Gordon M. Martin, M.D., Rochester, Minn., Third Vice-President.

A. B. C. Knudson, M.D., Washington, D. C., Fourth Vice-President.

Donald L. Rose, M.D., Kansas City, Kan., Fifth Vice-President.

Frances Baker, M.D., San Mateo, Calif., Secretary.

Frank H. Krusen, M.D., Rochester, Minn., Treasurer.

Walter J. Zeiter, M.D., Cleveland, Executive Director.

Dorothea C. Augustin, Chicago, Executive Secretary.

Other Officers Named for 1953

Dr. **Walter M. Solomon** of Cleveland was elected to succeed himself to serve a term of three years on the financial committee.

Dr. **Fred B. Moor** of Los Angeles was reappointed to serve a term of six years on the Editorial Board of the ARCHIVES OF PHYSICAL MEDICINE.

Dr. **Robert L. Bennett** of Warm Springs, Ga., was appointed to serve a term of seven years on the Board of the American Registry of Physical Therapists, beginning January 1, 1953.

Dr. **William Schmidt** was re-elected to the American Board of Physical Medicine and Rehabilitation for a six year term as a representative of the American Congress of Physical Medicine and Rehabilitation.

Meeting of American Academy

The American Academy for Cerebral Palsy announces that its annual meeting was held in Durham, North Carolina, October 2-4. Scientific sessions were open to physicians interested in the problem of cerebral palsy. The sessions were held at the Cerebral Palsy Hospital at Duke University.

Rehabilitation Beach

The Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center, New York City, recently opened a swimming pool and beach for disabled children. Instructors are provided by the Red Cross.

Amendments Approved at Congress Meeting

At the 30th annual session of the American Congress of Physical Medicine held in New York, August 25-29, 1952, the following amendments to the Constitution and By-Laws were made:

1. Amend Constitution, Article I, to read as follows:

"Article I — Name

The name of this organization is the American Congress of Physical Medicine and Rehabilitation, hereafter referred to as the Congress."

2. Amend Article VIII, Section 1, to read as follows:

"This organization shall operate a Registry for the purpose of maintaining a list of physical therapists competent and qualified to administer adequate physical therapy under the specific prescription and direct supervision of licensed physicians.

"All matters pertaining to the functioning of the Registry shall be managed by a Board of Registry which shall be composed of nine members. Seven members shall be appointed by the president of the Congress and confirmed by the voting members of the Congress. Two members shall be designated by the American Physical Therapy Association and shall serve during the pleasure of that organization. The members appointed by the Congress shall assume office January 1 following their appointment. Only such members of the Congress as are in good standing in the Congress and practice physical medicine exclusively shall be appointed to represent the Congress on the Board. Each member appointed by the Congress to serve on the Board shall serve a term of seven years, so arranged that the ultimate objective shall be one appointment and one confirmation annually. If before the expiration of the term for which appointed and confirmed a member of the Board representing the Congress dies, is removed or becomes disqualified, the president of the Congress shall designate a qualified person to serve the unexpired portion of the term and the person so designated shall assume office immediately."

3. Amend Constitution, Article X, Section 1, as follows:

"Article X, Section 1 — Name

The official publication of the Congress is the Archives of Physical Medicine and Rehabilitation in which shall be published all official Congress notices and transactions of sessions of the Congress, either in abstract or in full. The management of the Archives of Physical Medicine and Rehabilitation shall be vested in an Editorial Board to be constituted as provided for in the succeeding section."

4. Amend Constitution, Article XVI, to read as follows:

"This Constitution may be amended in whole or in part at any annual business meeting by a two-thirds vote of all voting members present and voting provided that prior to that time the amendment —

(1) Has been presented in writing at the previous annual business meeting, and

(2) A copy of the proposed amendment, together with a notice that the matter will be voted on is sent by mail to each member or is published in the Archives of Physical Medicine and Rehabilitation not less than one month in advance of the annual business meeting at which action is to be taken."

The name of the journal will be changed beginning January, 1953.

A. M. A. Physical Laboratory

The A. M. A. headquarters in Chicago has recently opened a physical laboratory for testing devices submitted to the Council on Physical Medicine and Rehabilitation. Dr. Frederic F. Jung is Director of the laboratory.

Newly Registered Therapists

August 4, 1952

Barron, Priscilla Ann, 2020 S. Hillside, Wichita, Kan.

Christiansen, Margaret Jeanette, 9 E. Bridge, Blackfoot, Idaho.

Christophersen, Philip Harlan, 2906 Charles St., Joseph, Mo.

Kennedy, Rosemary, 205 Greenway Rd., Salina, Kan.

Passmore, Norma June, Elmdale, Kan.

Schroff, Carle Highland, 305 Miami, Hiawatha, Kan.

Sellers, Alice Ann, 306 E. Kaskaskia, Paola, Kan.

Sprout, Thelma Loraine, 208 W. Wisconsin, Greensburg, Kan.

August 12, 1952

Cranmore, Charlotte L., Box 556, Ocala, Fla.

Dabato, Rosie, 1014 Gaston Ave., Fairmont, West Va.

Dean, Doris Ophelia, Avalon, Ga.

Gridley, Harold Dick, Lenora, Kan.

McCarthy, Dorothy Irene, 3228 January Ave., St. Louis 9, Mo.

McKinley, Harriet Jo Ann, 1634 N. Holyoke, Wichita 14, Kan.

Morris, Jeanne Beall, 800 Wheless Ave., Kerrville, Texas.

Tornquist, Axel Henning, 5012 8th Ave., Brooklyn, N. Y.

Turner, Claire Jean, 24 Outlook St., Newport, Vt.

August 20, 1952

Kinnison, Dorothy Muriel, Box 617, Monroe, La.

August 27, 1952

Anderson, Barbara Menke, 3507 Abby Lane, Jacksonville, Fla.

Buckham, Rodney Tellar, Jr., 142-20 41st Ave., Flushing, N. Y.

Fay, Margaret, 612 W. 115th St., New York 25, N. Y.

Featherman, Joan Mitchell, 102 Main St., Dalton, Pa.

Hasselbrock, Anna, 310 Birch St., Scranton 5, Pa.

Hill, Alvin, 200 Claremont Ave., Apt. 43, New York, N. Y.

Keenan, Kathleen Theresa, 175 Beach 132 St., Belle Harbor, L. I., N. Y.

Kravis, Herbert Zachary, 111 Cedar Ave., Newark 6, N. J.

Krug, Joan Gettell, 490 Bleeker Ave., Mamaronck, N. Y.

Meinhold, Carol Lois, 81 Centennial Ave., Brockport, N. Y.

Stenner, Nancy Ann, 2186 Five Mile Line Rd., Penfield, N. Y.

Strumfield, Dorothy, 448 Cyrus Pl., Bronx 58, N. Y.

Wagner, Donald Bert, 624 E. Philadelphia St., York, Pa.

Walters, Raymond Odean, 31 S. Bentley Ave., Niles, Ohio.

Zelmanowitz, Margaret M., 195 Kingston Ave., Brooklyn 13, N. Y.

September 1, 1952

Branes, Gordon Keith, 1219 Cypress St., St. Paul 6, Minn.

Cudworth, Paul Floyd, 1911 Pinecrest Drive, Ferndale 20, Mich.

Field, Helen Erline, 48 Prospect St., Cuba, N. Y.

Gray, Ella Frances, 5 Peck Street, Bristol, R. I.

Hammond, Eleanor Jean, Cape Vincent, N. Y.

Harms, Richard Milton, 4610 Park Blvd., Wildwood, N. J.

Jackson, John T., 1227 Warner St., Pittsburgh 12, Pa.

Jackson, Margaret Louise Schreiber, 84 Prospect Street, Attica, N. Y.

Kaneko, Marion Hideko, 908 Middle Avenue, Menlo Park, Calif.

Kimmel, Bernard, 520 S. Pleasant St., Royal Oak, Mich.

King, Jane, Hedgecroft Hospital and Clinic, Houston, Texas.

Kruse, Robert Douglas, 1337 Lenox Ave., Detroit 15, Mich.

Menefee, Dorothy Frances, 1150 First St., S. W., Rochester, Minn.

Morey, Margaret Alice Hise, 312 Center St., East Aurora, N. Y.

Nelson, Mildred Louise, Box 55, Ludlow, Pa.

Odell, David Field, 204 E. Main St., Beacon, N. Y.

Onishi, Nobuko Notch, Box 128, Garfield, Utah.

Shaffer, Dale Vernon, 170 Maple St., Slippery Rock, Pa.

Street, Sarah Anne, 817 Euclid Ave., Syracuse, N. Y.

Tate, Margaret Joyce, 2407 Twelfth St., Altoona, Pa.

Weidler, Oscar Paul, 1328 Second St., S. E., Rochester, Minn.

Wilk, Edwina Frick, 304 Vinta Rd., Manitou, Colo.

New Congress Members

The following were elected to membership in the American Congress of Physical Medicine and Rehabilitation at the recent New York meeting:

Adams, Ernest, Percy Jones Army Hospital, Battle Creek, Mich.

Andelman, Sumner Yale, 1611 S. Boston Ave., Tulsa, Okla.

Baer, Adrian D., 13635 E. 13th Ave., Denver 8, Colo.

Bankert, Charles W., 100 Lafayette Blvd., Williamsville 21, N. Y.

Benton, Joseph G., NYU-Bellevue Medical Center, 477 1st Ave., New York 16, N. Y.

Bingham, Robert, 3205 Main St., Riverside, Calif.

Brittis, Anthony L., 78 Park Hill Ave., Yonkers 2, N. Y.

Brock, Ralph L., Valley Forge Army Hospital, Phoenixville, Pa.

Doman, Robert J., 5214 Bella Vista Rd., Drexel Hill, Pa.

Dugdale, Frederick E., 203 S. Cleveland Ave., Wilmington 5, Del.

Erdman, William J., II, 3600 Spruce St., Philadelphia 4, Pa.

Fillmore, R. S., VA Center, Temple, Texas.

Fowler, John R., 11506 77th Ave., Edmonton, Alberta, Canada.

Gaston, John Zell, Box 147, Webster, Texas.

Goldman, Joel, 13 E. Market St., Lewistown, Pa.

Goodgold, Joseph, Valley Forge Army Hospital, Phoenixville, Pa.

Gullickson, Glenn, Jr., 1730 Irving Ave., S., Minneapolis 5, Minn.

Keever, Kenneth W., Warm Springs Fdn., Warm Springs, Ga.

Kelly, William J., 1565 Jasmine St., Denver 7, Colo.

Kristeller, Edith Lind, 414 W. 121st St., New York 27, N. Y.

Lane, Alfred L., 501 Main St., W., Rochester 8, N. Y.

Leass, Reuben, 1240 Beach 9th St., Far Rockaway, N. Y.

Mahl, Murray M., 334 E. 91 St., Brooklyn 12, N. Y.

Mautner, Herman E., 5101 18th Ave., Brooklyn, N. Y.

McCartney, James L., 223 Stewart Ave., Garden City, N. Y.

McMorris, Rex O., 1301 13th Ave., N. E., Rochester, Minn.

Moore, Walter H., Letterman Army Hospital, Box 13, San Francisco, Calif.

O'Rourke, William J., Veterans Administration Hospital, Richmond 19, Va.

Read, Joseph C., 384 Peachtree St., N. E., Atlanta 3, Ga.

Rogers, Eugene J., U. S. Army Hospital, Camp Gordon, Augusta, Ga.

Rubin, David, 1815 Ocean Front, Santa Monica, Calif.

Schram, Duane A., Gonzales Warm Springs Fdn., Gonzales, Texas.

Stillwell, George K., 2333 Priscilla Ave., St. Paul 8, Minn.

Sutton, Bruce B., Pearl Rd., Strongsville, Ohio.
Tarafa, Jose Ignacio, Calle 23 #508, Vedado, Havana, Cuba.

Throne, Elias M., 48 Cambon Dr., San Francisco 27, Calif.

Welsh, Edwin C., Wood, Wis.

Wickler, Gerhard S., Outwood, Ky.

Physical Therapy Degree Offered

The University of Buffalo, Buffalo, N. Y., recently announced the establishment of a program in physical therapy, offering a degree. The program began with the September semester. A four year program will lead to a bachelor of science degree with a major in physical therapy. A 12-month course leading to a certificate of proficiency in physical therapy is offered only to students of advanced standing. The program will meet standards established by the Council on Medical Education and Hospitals of the American Medical Association, the American Physical Therapy Association, the American Registry of Physical Therapists, and the New York State Department of Education. Dr. Henry V. Morelewicz is Medical Director of the program.

Polio Booklets

The National Foundation for Infantile Paralysis has issued two new booklets on polio, namely, "Management of Poliomyelitis Patients with Respiratory Difficulty" and "Isolation Techniques and Nursing Care in Poliomyelitis." The booklets may be obtained by writing to the foundation at 120 Broadway, New York 5, N. Y.

Kessler Institute Fall Conference

A full day conference on the rehabilitation of paraplegics was given on October 10 at Kessler Institute for Rehabilitation. Drs. Arthur S. Abramson and Howard A. Rusk participated in the panel discussions.

Personals

Dr. **Jerome S. Tobis** has recently been appointed Director and Associate Professor of the newly created Department of Physical Medicine and Rehabilitation at the New York Medical College, Flower-Fifth Avenue Hospital.

Dr. **William B. Snow** of New York was a guest lecturer at the rehabilitation symposium held at the Jewish Sanitarium and Hospital for Chronic Diseases in September.

At the recent New York meeting of the Congress, Dr. **Walter J. Solomon** was elected Chairman of the Editorial Board of the ARCHIVES.

Dr. **Arthur A. Rodriguez**, Chicago, Illinois, addressed the Illinois State Nurses' Association on October 10. The title of his talk was "Newer Concepts and Techniques of Physical Rehabilitation."

Dr. **Herbert Kent**, Chief, Physical Medicine Rehabilitation, Veterans Administration Hospital, Indianapolis, Indiana, participated as a resource person in the "Workshop on Gerontology" at Indiana University, Bloomington, Indiana, on September 25-26, 1952. The topic, "Opportunity for Good Health Practices and Rehabilitation of Disabilities," was discussed.

Dr. **Louis B. Newman** delivered a lecture at the Annual Convention of the American Association of Rehabilitation Therapists, New York City on September 3, 1952. Dr. Newman's presentation was on "The Significance of Total Rehabilitation."

At the October meeting of the American Academy for Cerebral Palsy, held in Durham, N. C., the following participated: Joseph E. Markee, Ph.D., showed film on "Functional Anatomy of the Hand"; **George G. Deaver**, M.D., spoke on "Clinical Approach to the Etiology of 100 Cases of Cerebral Palsy and Its Correlation with Signs and Symptoms"; Temple Fay, M.D., presented "Effect of Carbon Dioxide and Oxygen Inhalation on Movement and Muscular Hypertonus in Athetoids"; and **Lenox D. Baker**, M.D., spoke on "Review of Surgical Procedures in Cerebral Palsy."



BOOK REVIEWS

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation.

ANNUAL REVIEW OF PHYSIOLOGY. *Victor E. Hall*, Editor, University of California School of Medicine, Los Angeles; *Jefferson M. Crismon*, Associate Editor, Stanford University; *Arthur C. Giese*, Associate Editor, Stanford University. Volume 14. Cloth. Price, \$6.00. Pp. 589. Annual Reviews, Inc., Stanford, Calif., 1952.

The Annual Review of Physiology is one of those unusually stimulating volumes that will always contain valuable information for readers of very diverse interests. It is a necessity for the physiologist, but it is almost as essential to the clinician who is desirous of keeping ahead of new developments and trends as related to his particular medical specialty.

The Prefatory Chapter on the organization of Science has been written by Doctor Ralph Gerard of the University of Chicago. He traces science from its elemental and simple beginnings to the extremely complicated and highly organized complexity it presents today.

Doctor Gerard states that in the making of observations, in the development of interpretations, and in the communication of information, we come up against the problem of organization. At present, he says, and for the foreseeable future, basic science must look to government for support, abetted to some degree by industry. Scientists who have undertaken contracts with the Office of Naval Research and the U. S. Public Health Service have found to the surprise of many a minimum of red tape and paper work and complete freedom in prosecution of research. It is thus a reasonable expectation that the new National Science Foundation will perform as well.

The 1952 volume is the largest since 1949. While it must be a difficult task to select topics and reviewers for each annual review, the task confronting the reviewer selected is certainly a formidable one. In each instance, however, the work has been done with remarkable skill and interpretation. David Waugh, Department of Biology of M. I. T., reviews the physical properties of protoplasm. Growth is reviewed by L. J. Wells, of the University of Minnesota, in which sexual differentiation and the development of function are emphasized. Charles Ragan, Department of Medicine, Columbia University College of Physicians and Surgeons, reviews the physiology of the connective tissue, the main purpose of which is to consider loose connective tissue of the adult organism to which four definite functions have been described: support, transport, storage, and repair and protection. Robinson, of

Indiana, reviews the physiological effects of heat and cold. The physiologist will find this a profitable chapter. Spiegelman, of the University of Illinois, and Sussman, of Northwestern, review energy metabolism of biosynthesis at the cellular level in terms of enzymes and aggregates of enzymes. The interesting subject of water metabolism is reviewed by Robinson and McCance of the Department of Experimental Medicine, Cambridge University, England. James Whittenberger, of Harvard School of Public Health, reviews the respiratory system. He states that a wholly satisfactory interpretation of the integration of all the factors regulating respiration has yet to be developed. The first of a series of chapters is presented on comparative physiology, the first of which is written by Wiersma, of California Technical Institute, and deals with invertebrate muscle. Wiersma's review covers material of the past five years. Physiology of the digestive system is covered by Wilhelmj, of Creighton University. Fundamentals of blood clotting are reviewed by Flynn and Coon, of Columbia University; blood gas transport by Wood, of Minnesota; peripheral circulation by Pappenheimer, of Harvard; the heart by Gunnar Björck, Sweden; the lymphatic system by Richard Webb, of Indiana University School of Medicine; the kidney by Corcoran, Dustan, and Masson, of the Cleveland Clinic; excitation, conduction, and synaptic transmission in the nervous system by Brooks and Fuortes, of State University of New York College of Medicine; somatic function of the central nervous system by Marion Hines, of Emory University; visceral functions of the nervous system by Albert Kunz, of St. Louis; hearing by Gerandt, of Gothenburg, Sweden; the pituitary-adrenal system by J. W. Conn and Stefan Fajans, University Hospital, University of Michigan; the thyroid gland by Albert, of the Mayo Clinic; reproduction by Hartman, of the Ortho Research Foundation, New Jersey; and the physiology of the skin by Farber, of Stanford, and Lobitz, of Dartmouth Medical School. The volume closes with author and subject indexes. This volume is highly recommended for the physiologist. In these days of high costs it is pleasing to find so valuable a work produced at such a moderate price.

FROM DUGOUT TO HILLTOP. By *Margaret R. Stewart*, M.D. Cloth. Price, \$3.75. Pp. 233. Dr. Margaret R. Stewart, 916 East Monterey Road, Glendale 6, Calif., 1951.

An autobiography of a woman physician which tells the experiences and difficulties encountered

both as a physician and as a mother of a family. The title expresses the beginning on a farm in Nebraska to the time of her retirement to a home in California.

MAN AND HIS YEARS: AN ACCOUNT OF THE FIRST NATIONAL CONFERENCE ON AGING. SPONSORED BY FEDERAL SECURITY AGENCY. Paper. Price, \$1.75. Pp. 311. Health Publications Institute, Inc., 216 N. Dawson St., Raleigh, N. C., 1951.

This is an interesting report of a series of conferences on problems of aging conducted by a large group of persons including an advisory committee of fifty-six persons, a central staff of twenty-nine workers, and a group of thirty-four guests. Many physicians were included among these participants. The conference was arranged because President Truman requested the Federal Security Administrator "to explore with all appropriate groups, both within and outside of the Federal Government, the problems incident to our increasingly older population."

The book itself is divided into fourteen parts starting with a section on "Our Aging Population" by Oscar R. Ewing, Federal Security Administrator. The second section describes the conference and is written by John L. Thurston, Deputy Federal Security Administrator. There are also sections on the following subjects: population changes and economic implications; income maintenance; employment, employability, and rehabilitation; health maintenance and rehabilitation; education; family life, living arrangements, and housing; creative and recreational activities; religious programs and services; professional personnel; aging research; community organization; and a final section by the Conference Director, Clark Tibbits, entitled "Next Steps."

Of particular interest to the physiatrist is the section on health maintenance and rehabilitation. The group concluded that "Treatment and care cannot be said to be complete without adequate rehabilitative measures" and that "Medical rehabilitation can retard the progression of disease in many older persons; in others it can restore functions, either wholly or in part; in still others, it can correct a disability entirely. Particularly in later maturity and senescence, rehabilitation services can often bring disabled persons back to the point of self-care and sometimes to full or limited employment."

The group recommended specifically that in providing treatment and care for disabled older persons it is necessary to: "Study and evaluate the community resources for making adequate medical care available to older people. Aim at restoration of older persons to the fullest possible physical, mental, social, vocational, and economic usefulness. Plan institutional facilities and services to accord with the varying needs of the aged."

In summing up, Tibbits concluded that activity in solving the problems of the aged has increased because "we believe in the dignity of the individ-

ual and in the right to live life completely" and we are achieving "a broadening realization that the well-being and the participation of older people are essential to national security and the discharge of our international obligations."

This book should be read by every physician interested in geriatrics and by all physicians interested in rehabilitation of the disabled. It contains a wealth of material and summarizes the ideas of a large group of experts in various phases of the problems of aging.

CEREBRAL MECHANISM IN BEHAVIOR. THE HIXON SYMPOSIUM. Edited by Lloyd A. Jeffress, Professor Psychology, University of Texas. Cloth. Price, \$6.50. Pp. 311, with illustrations. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, 1951.

This book is the report of a symposium held at the California Institute of Technology in September, 1948. The topic of the symposium was "Cerebral Mechanisms" and to discuss it, an eminent group of scientists was brought to the Institute under auspices of the Hixon Fund Committee. The following papers were presented: the general and logical theory of automata by John von Neumann, Professor of Mathematics, Institute of Advanced Study; why the mind is in the head by Warren McCulloch, Professor of Psychiatry, University of Illinois; the problem of social order in behaviour by K. S. Lashley, Research Professor of Neuropsychology, Harvard; functional differences between the occipital and temporal lobes with special reference to the interrelations of behaviour and extra-cerebral mechanisms by Heinrich Klüver, Professor of Experimental Psychology, Chicago; relational determination in perception by Wolfgang Köhler, Research Professor of Philosophy, Swarthmore; brain and intelligence by Ward C. Halstead, Professor of Experimental Psychology, Chicago; and the symposium from the viewpoint of a clinician by Henry W. Brosin, Professor Psychiatry, Pittsburgh. An equally distinguished group formed a discussion panel.

Stenotype operators recorded the talks and discussions. The speakers revised and corrected these original records. The editor, Lloyd A. Jeffress, Professor of Psychology, Texas, then had the difficult task of cutting, patching, and omitting repetitious sections and irrelevant fragments of the material submitted. While such a procedure has taken a great deal of time, the result is undoubtedly a better book and one more nearly representing the authors' views. Dr. Jeffress is to be congratulated for having accomplished his purpose so well.

This is a series of lectures that will not interest the average clinician but should interest the psychiatrist who wishes to delve into the basic science and concepts of human behaviour. The book is particularly valuable in view of the extensive discussion which followed presentation of each paper.

PRESCRIPTION FOR MEDICAL WRITING.

A USEFUL GUIDE TO PRINCIPLES AND PRACTICE OF EFFECTIVE SCIENTIFIC WRITING AND ILLUSTRATION. By *Edwin P. Jordan, M.D.*, and *Willard C. Shepard*. Cloth. Price, \$2.50. Pp. 112, with 26 illustrations. W. B. Saunders Company, West Washington Square, Philadelphia, 1952.

Perhaps the most distinctive feature of this excellent manual is Chapter X by the senior author, Dr. Jordan, "Statistics Employed in Medical Papers." This chapter offers a competent introduction to such use of statistical methods, though its greatest value would appear to be the stimulus it affords the reader to delve more deeply into the subject with the aid of the list of references supplied. The author is to be highly commended for stressing the impossibility of proving a hypothesis by means of statistics and for pointing out the pitfalls that await an unsuspecting author using this tool. The sections on presentation of statistical data are admirably illustrative and informative. A fuller explanation of the use of the zero base line might well have been given, especially its value in a series of "pie" diagrams. No such base line is given in the illustration of this device which appears in the text. The author is also to be commended for pointing out the fallacy of using percentages when fewer than 100 observations are involved.

The chapter on illustrations, prepared by the associate author, Mr. Shepard, gives the impression of being written by a photographic technician rather than an editorial expert, though this does not detract from its value. As compared with similar chapters in other manuals it is adequate and complete, giving the usual instructions as to preparation and reproduction of drawings and photographs, with valuable advice on proper emphasis and unified, intelligible presentation.

The book faithfully lives up to the Latin motto appearing on the title page, *Quidquid Praecipies Esto Brevis* — Whatever you undertake be brief. Indeed, one might wish that the senior author had been more prodigal with the cogent advice and suggestions contained in the first seven chapters, which deal with the practical questions of actual preparation of a manuscript from the first preliminaries to the making of an index. He certainly is equipped to do so. Taken together these chapters amount to a sound and practical dissertation on the rhetorical principles of Unity, Mass and Coherence — with the medical writer always in mind.

YOUR MIND AND APPEARANCE: A PSYCHOLOGICAL APPROACH TO PLASTIC SURGERY. By *Adolph Abraham Apton, M.D.* Cloth. Price, \$3.00. Pp. 212, with 28 illustrations. Citadel Press, 120 E. 25th St., New York 10, 1951.

This is another book by a plastic surgeon designed to describe the many beneficial operations now possible and their psychological value to the patient. Numerous case histories are used and discussed in lay terms. It does not have the technical details to interest the plastic surgeon and is too superficial for the psychiatrist. It is of

some interest to laymen in rehabilitation work as a reference in regard to use of plastic surgery.

CARDIAC EMERGENCIES AND HEART FAILURE. PREVENTION AND TREATMENT. By *Arthur M. Master, M.D.*, Cardiologist, Mount Sinai Hospital, New York, N. Y.; *Marvin Moser, M.D.*, 1st Lt., USAF (MC), Walter Reed Army Hospital, Washington, D. C. Former Fellow, Cardiology, Mount Sinai Hospital, New York, N. Y., and *Harry L. Jaffe, M.D.*, Adjunct Physician, Cardiology, Mount Sinai Hospital, New York, N. Y. Cloth. Price, \$3.00. Lea & Febiger, Washington Square, Philadelphia 6, 1952.

This is a text containing a great quantity of practical information on the prevention, diagnosis and treatment of cardiac emergencies and heart failure. Although small in size with only 159 pages and 13 illustrations, it is indeed large in the wealth of wisely selected medical information. Of particular note is the most adequate coverage given cardiac arrhythmias, acute pulmonary edema and congestive failure, and angina pectoris. Also covered are cardiac syncope, rheumatic heart disease, hypertensive encephalopathy, dissecting aneurysm, traumatic heart disease and surgical emergencies in cardiovascular disease. Exact treatment methods are presented including adequate interval therapy. Case histories and illustrations have been used to great advantage to explain more completely specific cardiac conditions and their response to treatment. Commonly accepted drugs as well as the newer drugs are discussed. Throughout the text physiology and pathology of the various conditions are discussed as they relate to the treatment problems of the particular disorder.

The value of this text cannot be easily described. The clear, concise, well-written style of the authors plus the very practical aspects of the text's contents throughout make it most desirable for use by students, residents, general practitioners and internists, as well as an addition for every working medical library.

CHIROPODIAL ORTHOPAEDICS. By *Franklin Charlesworth, F.Ch.S.*, Consultant Chiropodist, Hope Hospital, Salford; School Health Service, Salford; Department of Civic Welfare, Salford. Member of Panel of Examiners, Society of Chiropodists. Sometime Director of Studies, East Lancashire Foot Hospital School of Chiropody. Foreword by *Sir Harry Platt, M.S., F.R.C.S., F.A.C.S.*, Professor of Orthopaedic Surgery, University of Manchester. Cloth. Price, \$5.50. Pp. 255, with illustrations. The Williams & Wilkins Company, Mt. Royal and Guilford Avenues, Baltimore 2, 1951.

This monograph describes in detail with the assistance of frequent and excellent photographs methods of making and fitting a variety of pads, molds, and foot supports which the author has found successful in his practice. Some illustrative case histories are also presented.

Orthopedic surgeons, physiatrists and chiropodists will find this book of interest and value.

MEDICAL ETHICS AND THEIR EFFECT UPON THE PUBLIC. By *Louis Gruenzel*. Cloth. Price, \$2.00. Pp. 79. Vantage Press, Inc., 230 West 41st Street, New York 18, 1951.

In this small book criticism is leveled at the conservative code of medical ethics which forbids advertising, financial awards for scientific discoveries, and demands critical analysis of new methods of treatment before acceptance. The author feels that this rigid code is preventing low cost medical care and causes poor public relations. The forcefulness of the arguments is weakened by personal and normal prejudice in reference to the author's own symptoms of arthritis apparently alleviated by a doctor's method of treatment which did not receive the approval of the medical profession.

The subject of ethics and their effect on public relations is not to be overlooked as there is certainly room for improvement, and this volume is worthy of serious study by the profession.

METHODS IN MEDICINE. By *George R. Herrmann*, M.D., Ph.D. Second Edition. Cloth. Price, \$7.50. Pp. 488. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1950.

This manual has been planned as a practical ward or bedside guide for the clinical investigation of the common and some of the more rare diseases. Although more than an "intern's manual," its usefulness will be most apparent to the house officer or the young practitioner. The book has developed as a manual of medical practices of the service of Doctor George Dock of the Washington University School of Medicine, and attempts a comprehensive coverage of everything from history taking to some of the more unusual laboratory procedures. Special care is taken to describe the technique of history taking and the routine of the physical examination. Laboratory procedures are treated somewhat more sketchily, but on the whole adequately. The procedures described for blood chemistry methods seem oversimplified and the description given for the preparation of the reagents incomplete. Descriptions of hematological procedures are much more adequate. A general criticism of the laboratory portion of this book could be summed up by saying that it is too comprehensive for the average practitioner and too sketchy for the average clinical pathologist or technician. Of special interest and by far the best section of the manual is the third part, which deals with methods of clinical investigation. Separate chapters are devoted to infectious diseases, hematological disorders, metabolic and endocrine disorders, and so forth; these present in a concise, yet complete manner, pertinent historical, physical, and laboratory methods for each group of disease. This seems to the reviewer to be an excellent approach and one that is neglected in most textbooks of this type. The final part of the book has to do with therapeutic methods, stressing in particular techniques involved in treating medical emergencies. The book can be highly recommended for almost anyone practicing medicine, be he student, house officer, or practitioner.

THE 1951 YEAR BOOK OF PHYSICAL MEDICINE AND REHABILITATION. Edited by *Frank H. Krusen*, M.D., Professor of Physical Medicine, Mayo Foundation; Head of the Section on Physical Medicine and Rehabilitation, Mayo Clinic, Associate Editors: *Earl C. Elkins*, M.D., Assistant Professor of Physical Medicine, Mayo Foundation, Consultant in Physical Medicine and Rehabilitation, Mayo Clinic, and *George G. Deaver*, M.D., Professor of Clinical Rehabilitation and Physical Medicine, New York University College of Medicine; Director of the Department of Physical Medicine and Rehabilitation, Bellevue Hospital. Cloth. Price, \$5.50. Pp. 382, with illustrations. The Year Book Publishers, Inc., 200 East Illinois Street, Chicago 11, 1952.

The Year Book for 1951 presents a ready and easily read review of the literature in Physical Medicine and Rehabilitation for that year. Its editors have carefully selected and included pertinent articles in proportions which reflect the healthy growth and expanding interests of this specialty.

"Keeping up with the literature," a difficult task for all physicians, is greatly simplified by this book. The editors' concise comments, based on their long experience in the sound practice of physiatry, following many of the abstracts add to the value of the text.

There are 366 pages of text; 117 of these contain abstracts of the literature pertaining to physical agents and methods such as electromyography, devices and mechanical procedures, exercise, heat and cold, medical electricity, diathermy, hydrotherapy and ultrasonics. One hundred and sixty-nine pages are devoted to abstracts from the literature regarding specific conditions. These include such subjects as poliomyelitis, cerebral palsy, amputees, arthritis, peripheral vascular disease, hemiplegia, paraplegia, multiple sclerosis, and aphasia, to mention a few.

Spina Bifida and problems related to the total management of patients with this condition are presented in a special article by one of the editors and two co-authors (Deaver).

Reports in the literature on physiology and anatomy, diagnostic applications, and geriatric medicine are also included.

The editors and publishers deserve much credit for this book, which is adequately illustrated and has an attractive format. It well serves the need of the physiatrist, others interested in the clinical and basic sciences related to this specialty, the physical therapist and the occupational therapist.

MEDICAL AND PHYSICAL DIAGNOSIS. INTERPRETATION OF FINDINGS. By *Samuel A. Loewenberg*, M.D., F.A.C.P., Clinical Professor of Medicine, Jefferson Medical College. Eighth Edition. Cloth. Price, \$13.50. Pp. 1334, with 717 illustrations. F. A. Davis Company, 1914-16 Cherry Street, Philadelphia 3, 1951.

This text is a classic in medical and physical diagnosis. It is well written, well organized and contains a wealth of general information. It also contains an abundance of illustrations, diagrams

and charts for ready reference to many of the medical specialties.

In general most sections are so well done that there is little room for criticism. However, it is noted that the description of Raynaud's Disease is extremely brief and Raynaud's Phenomenon secondary to other diseases has been omitted, except for brief mention with Scleroderma. Cranial or temporal arteritis, chronic venous insufficiency, and the complications therefrom have also been omitted.

A statement is made on pages 912-913, "When vitamin K is given either by mouth or parenterally, an adequate amount of bile or bile salts must be given simultaneously," which appears to be a mis-statement, inasmuch as bile or bile salts are not required with water soluble preparations of vitamin K and are not necessary when giving oil soluble preparations parenterally.

The discussion of Lupus Erythematosus omits some of the major advances in this disease during the past few years, namely, the LE phenomenon by Hargraves and the plasma LE test by Hasegawa.

These criticisms are minor compared to the overall excellent qualities of this text and it can be highly recommended to students, general practitioners, and specialists in medicine.

THE RHEOLOGY OF THE CROSS STRIATED MUSCLE FIBRE. WITH PARTICULAR REFERENCE TO ISOTONIC CONDITIONS. By Fritz Buchthal and E. Kaiser, in Collaboration with Poul Rosenfalck. Paper. Price, Crs. 35 (Danish). Pp. 318, with illustrations. Ejnar Munksgaard, 6 Norregade, Copenhagen K, 1951.

Rheology is a relatively new term introduced into physics about twenty years ago. Its application to physiology has been rather scarce. By definition it is a branch of physics which deals with the deformation and flow of matter. Biological structures hardly display any example of the simple type of rheological behavior, and the recent progress in the description and understanding of the complex elastic and flow properties of rubber-like substances and of plastics provides a basis for an application of these conceptions to biological systems as well.

The mechanical properties of skeletal muscle have always been a problem of special interest to physiologists, and they have been considered a central problem in the understanding of the minute structural changes underlying the mechanism of contraction. The present paper deals with properties of the isolated fibre at rest and during shortening. It represents a continuation of a study previously published in 1942, but which treated the mechanical behavior of the isolated fibre recorded at constant length. The authors have applied some of the concepts developed in modern rheology for a description of the experimental results and the minute structural interpretation. In part four a molecular model is analyzed and on its basis a theory of contraction is suggested as far as possible in quantitative terms. The authors do not pretend to present a complete

survey of the literature on the mechanical behavior of muscle, but refer the reader to excellent reference sources.

The authors state they are greatly indebted to Rosenfalck for the mathematical treatment in parts two and four. The monograph is longer than the authors wished; some of the experimental material was acquired during World War II and after the war was found to need further elaboration both theoretically and experimentally.

The work is presented in four parts: part one deals with method; part two deals with rheology of the resting fibre; part three discusses the dynamics of isotonic contraction; and part four is devoted to the minute structure and interpretation of mechanical properties. Following part four there are three appendices: one, the non-linear length-tension diagram and the amplitude dependence of the stiffness; two, amplitude, dependence of vibrational stiffness; three, shortening velocity as a function of load in the isolated fibre and in whole muscle. A carefully selected list of references is included as well as a list of symbols used in this work. The book is well indexed.

While this volume will not interest the average clinician, it should find a ready welcome from physiatrists who are interested in research on muscle physiology. The physiologist will find this a most fascinating and valuable contribution to the still unsolved mystery of muscular contraction. The text is well illustrated and easily read, although one must be well equipped mathematically to follow out the experimental procedures. This monograph is highly recommended.

INDUSTRIAL MEDICINE ON THE PLUTONIUM PROJECT: SURVEY AND COLLECTED PAPERS. Edited by Robert S. Stone, M.D., Professor of Radiology and Chairman of Division of Radiology, University of California School of Medicine, San Francisco. National Nuclear Energy Series, Manhattan Project Technical Section, Division IV — Plutonium Project Record, Volume 20. Cloth. Price, \$6.25. Pp. 511, with illustrations. McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 18; Aldwych House, Aldwych, London, W.C.2, 1951.

This recent addition to the National Nuclear Energy Series, which is expected to reach an ultimate total of 60 volumes, deals with the health hazards involved in work with radioactive substances like plutonium. Nineteen contributing authors are listed for this volume. Several chapters describe the health services that have been developed to protect workers from over-exposure, and several more describe the hematological effects of ionizing radiations. Two chapters deal especially with plutonium and one with radium. Of most immediate interest to the practicing physician are the chapters on the treatment of exposed personnel and on the tolerance to whole-body irradiation of patients with advanced cancer.

The book is extremely well organized and clearly written, has ample bibliographic references, and is well indexed.

UNDERSTANDING HEREDITY. AN INTRODUCTION TO GENETICS. By *Richard B. Goldschmidt*, University of California. Cloth. Price, \$3.75. Pp. 228. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, 1952.

Understanding Heredity has been written for students who do not intend to specialize in biology as well as for the layman who wants to acquire an elementary knowledge of genetics. The author, Doctor Richard B. Goldschmidt, of the University of California, has presented a short and easily read survey of the basic facts of this intimate and fascinating science. It required a scientist of the order of the author to do this in such an excellent and easy style without sacrificing the accuracy of the text. This was no mean task.

There is an actual need for the instruction found in this volume because of the ridiculous claims made by the so-called Lysenkoism of the Soviet Union. It is important that the thinking people be provided with information which permits them to think for themselves. The chapters included in this book are: 1, hereditary and non-hereditary traits; 2, the sex cells and fertilization; 3, elementary Mendelism; 4, more on elementary Mendelism; 5, chromosomes and Mendelism; 6, linkage; 7, mutation; 8, sex chromosomes and sex-linked inheritance; 9, collaboration of genes; 10, summative or multiple factors; 11, multiple alleles; and 12, a glimpse of more technical facts and problems of genetics. At the close of the book a series of problems to be worked out for each chapter are presented. A list of books is given for further study and finally an excellent glossary of terms is included. The volume closes with an adequate index.

This book is highly recommended to all those who wish to gain an elementary knowledge of this absorbing subject. The reviewer believes that the author's desire to stimulate the student to further and more advanced reading will be accomplished once this fascinating volume is read.

THE STUDY OF INSTINCT. By *N. Tinbergen*. Cloth. Price, \$7.00. Pp. 228, with 130 illustrations. Oxford University Press, 114 Fifth Ave., New York 11; Amen House, Warwick Sq., London, E.C.4, 1951.

This book is an extension of a series of lectures delivered under the auspices of the American Museum of Natural History and Columbia University by Professor Tinbergen of Oxford University. The aim of the author is to call attention of Anglo-American workers to research done on the European continent. Most of this work was published in German and little of it has penetrated into English and American science. In addition, the author attempts organization of the ethological problems into a coherent whole and especially to the problems of the causes underlying instinc-

tive behaviour. These problems are dealt with in the first five chapters. The principal aim of Professor Tinbergen in this section has been, first, to elucidate the hierarchical nature of the system of casual relations, and to stress the paramount importance of recognizing the different levels of integration; and second, to bring ethology into contact with neurophysiology. Chapters six to eight inclusive deal with ontogeny, adaptiveness, and evolution. The author states that these chapters were added with considerable hesitation because of the unsatisfactory state of these more or less neglected fields of ethology.

The following is a list of the chapter headings: ethology: the objective study of behaviour; behaviour as a reaction to external stimuli; the internal factors responsible for the spontaneity of behaviour; further consideration of external stimuli; an attempt at a synthesis; the development of behaviour in the individual; the adaptiveness of behaviour; and the evolution of behaviour. A valuable and extensive bibliography is included. The work is well illustrated, indexed, and Professor Tinbergen has made an admirable presentation of his material. The text is written in good concise understandable language. The author undertook and has accomplished a most difficult task. Science is greatly indebted for this splendid contribution.

SIGNS AND SYMPTOMS. APPLIED PATHOLOGIC PHYSIOLOGY AND CLINICAL INTERPRETATION. Edited by *Cyril Mitchell MacBryde*, A.B., M.D., F.A.C.P. Associate Professor of Clinical Medicine, Washington University School of Medicine; Assistant Physician, the Barnes Hospital; Director, Metabolism and Endocrine Clinics, Washington University Clinics, St. Louis, Missouri. Second Edition. Fabrikoid. Price, \$10.00. Pp. 783, with 98 illustrations, 50 charts and 8 color plates. J. B. Lippincott Company, East Washington Square, Philadelphia, 1952.

This book is especially designed as an aid to diagnosis. It consists of 31 chapters, covering 783 pages and includes 98 illustrations, 50 charts and 8 color plates. It is the product of 26 contributors. Each chapter covers very adequately a particular sign or symptom and includes the anatomy, pathology, chemistry, physiology and psychology as they are related to the mechanism of sign or symptom under discussion. This the second edition of the work includes new chapters on Pathologic Bleeding, Pigmentation of the Skin, Vertigo and Dizziness, Clubbed Fingers and Hypertrophic Osteoarthropathy. Each chapter is written clearly and concisely and contains much valuable medical information and new techniques as regards the diagnosis of disease. A complete list of references occurs at the end of each chapter. The publishing is good. The book is highly recommended for use by all physicians.

PHYSICAL MEDICINE ABSTRACTS

Iritis as the Presenting Symptom in Ankylosing Spondylitis. M. Q. Birkbeck; W. St. J. Buckler; R. M. Mason, and W. S. Tegner.
Lancet 6688:802 (Nov. 3) 1951.

The syndrome of ankylosing spondylitis can present itself in many ways. Classically it occurs in young males who complain of backache and a stiffness, but it is now known that its early manifestations can be so mild that in some patients medical aid is not sought until ankylosis is well advanced. Other patients may never complain of trouble in the back, and the condition is discovered only incidentally or when the complete rigidity of the back leads to some disaster such as not being able to turn and see the oncoming traffic and being knocked down as a result. That ankylosing spondylitis often is associated with iritis is generally recognized. Most workers who have published series of cases of this condition mention the incidence of iritis among their patients. In a series of patients attending the Department of Physical Medicine at the London Hospital, 13 out of 148 sufferers from ankylosing spondylitis have had iritis. But it is not generally realized that iritis can be the presenting sign of this syndrome, and the authors have recently met no fewer than eleven patients who have been found to be suffering from ankylosing spondylitis when they first sought medical attention for iritis. The iritis which is found in association with ankylosing spondylitis is regarded by ophthalmologists as a nonspecific manifestation of an allergic response. In view of the powerful therapeutic effects of radiotherapy, cortisone, and adrenocorticotrophic hormone in ankylosing spondylitis the possibility of a coexisting ankylosing spondylitis should be explored in all patients suffering from nonspecific iritis, so that such spondylitis can be treated as early as possible.

Neurological Changes in Anterior Poliomyelitis and Their Implications in Treatment. Edward B. Schlesinger.

Arch. Neurol. & Psychiat. 66:600 (Nov.) 1951.

The Kenny treatment of acute and subacute anterior poliomyelitis rests in part on unsound physiological concepts. This state is in part due to the neglect of the disease by the neurologist and the misinterpretation of clinical signs by less adroit students of the nervous system. The concept of treatment as being largely a problem in combating muscle spasm is erroneous. The term "muscle spasm" as used in describing clinical patterns in poliomyelitis bears no resemblance to the term as understood by the neurologist. The clinical changes in poliomyelitis represent progressive manifestations of involvement of various parts of the central nervous system and vary strikingly

from case to case, depending on the areas affected and the severity of the lesions. Three phases of neurological changes and their implication are described. The fallacy of attempting to treat all phases by a single therapeutic agent, thermal or pharmacological, is discussed. A clinical experiment designed to demonstrate the latter point is described. The author draws the following conclusions: The Kenny method of therapy is sound in respect to its goal of preventing deformity, shortening of muscles, and loss of muscle volume by range-of-motion exercises. The underlying concepts of Kenny doctrine are unsound physiologically and lead to ritualistic and empirical management of the disease process. Members of the medical profession have been quick to improve traditional techniques by adopting some of Kenny's methods, but lamentably uncritical of her concepts. The Kenny and generally medically accepted concepts of "muscle spasm" in poliomyelitis probably are erroneous in physiological terms. "Muscle spasm" actually can be divided into large groups of pathological neural mechanisms of clinical significance. The various entities which are grouped under the name of "muscle spasm" cannot be expected to respond to a single therapeutic agent. Hot packs, muscle relaxants, and such, must be exhibited in proper relation to the mechanisms at play at a given point in the progress of the disease to be of value.

The evidence adduced discounts the value of muscle relaxants during at least one phase of the acute disease.

Roentgen Therapy in Bursitis of the Shoulder: An Analysis of Fifty Cases Using Both Deep and Superficial Techniques. C. M. Witt, and P. F. Titterington.

J. Missouri M. A. 48:870 (Nov.) 1951.

This paper presents the results of fifty consecutive cases of subacromial bursitis. All of the patients represented here are those in whom adequate statistical data was available to evaluate the immediate response to roentgen therapy. Efforts were made to evaluate only the degree of relief of pain since this was the primary aim of treatment. All were patients referred to the authors, as radiologists, for treatment, and all were treated as outpatients. The patients then returned to the referring physician for follow-up care if any was needed. Many forms of therapy have been used in the treatment of bursitis. These include procaine injection, physical therapy in many forms and even a variety of drugs including neostigmine. Some authors have stressed physical therapy during roentgen therapy, to include manipulation under anesthesia, or to follow the relief of the initial pain by roentgen therapy or by other

means, with physical therapy. Roentgen therapy has long been recognized as a valuable method in the treatment of bursitis. This therapy is more effective in acute bursitis than in chronic disease. Of the former, 96.2 per cent obtained good results; of the latter only 85.8 per cent. There were many more treatment failures in the chronic group. There would appear to be little significant differences in the use of deep and superficial roentgen therapy, provided adequate penetration is used to reach the site of the disease.

Reflexes Evoked by Cold Stimuli in Injuries of the Spinal Cord. Lewis J. Pollock; Benjamin Boshes; Herman Chor; Isidore Pinkelman; Alex J. Arief; Meyer Brown, and John R. Pinkle.

Arch. Neurol. & Psychiat. 65:662 (May) 1951.

Intrigued by the challenge of an article by Macht and Kuhn, in which it is pointed out that there is a paucity of information on the reflexes evoked by cold stimuli in spinal man, Pollock and co-authors studied such responses in their material of injuries to the spinal cord. As was expected, the stimulus of cold, as in the case of other exteroceptive stimuli, produced reflex activity from the distal end of an injured spinal cord. The effectiveness of the stimulus was less than that of scratch or of multiple pinprick. The responses occurred from stimulation of similar reflexogenous zones. As was the case with other stimuli, the greatest number of muscle groups participating in the reflexes occurred with injury of the cervical portion of the spinal cord; next, with injury of the thoracic portion, and least, with injury of the lumbar portion. The greatest number of cases in which no response followed stimulation was that of injuries to the lumbar portion of the spinal cord; next, that of injuries to the thoracic portion, and least, that of injuries to the cervical portion. The frequency of crossed reflexes was least with lesions of the lumbar portion of the spinal cord, next with lesions of the thoracic region and greatest with lesions of the cervical region. Ipsilateral reflexes alone predominated. With lesions of the cervical portion of the spinal cord, abnormal reflex activity in the upper extremities occurred from stimulation of the skin of the upper extremities. The arm and forearm were more effective reflexogenous zones than the hand, and the volar surfaces were more effective than the dorsal surfaces. The arms and forearm were the most effective zones for reflex movements of the shoulder, forearm and wrist; and the hand was the most effective for movements of the thumb and fingers. Ipsilateral and contralateral reflexes of the upper extremities were evoked from stimuli below the level of the lesion, in a few cases as low as the inner aspect of the thigh. Stimulation of the upper extremity resulted in reflex movements of the lower extremities in two instances, representing 5 per cent of 43 cases, whereas stimulation of the abdominal wall resulted in such reflex activity in 18 instances,

representing 41 per cent of 43 cases of lesions of the cervical portion of the cord. More reflex activity resulted from stimulation of the upper than of the lower abdominal quadrants.

The Hip Rotator. Guy Beauchamp.

Brit. J. Phys. Med. 14:259 (Nov.) 1951.

A detailed description of a hip rotator is given, with a brief notation of its therapeutic and diagnostic uses. Although the hip rotator was designed primarily to give resistive exercises for the muscles of rotation, active, passive, resisted and assisted movements also may be given. The hip joint can be rotated and mobilized by manual operation of the metal graduated scale. The advantages are readily seen. There is no need to undress, which in itself is a great time-saver, and the patients can, if necessary, put themselves on the machine and carry out the movements, while mobilization needs but a few moments of the physical therapist's time at the end of the exercises. The treatment time averages seven minutes. Limitation in abduction is treated by mobilization of the hip joint in ever-increasing degrees of abduction as measured on the scales on the front of the frame of the machine.

Fractures of the Elbow in Children. Walter P. Blount; Irwin Schultz, and Robert H. Cassidy.

J. A. M. A. 146:699 (June 23) 1951.

Fractures at the elbow joint are very common in children. They follow patterns so remarkably constant that they may be discussed in groups. While each fracture must be evaluated and treated individually, certain general rules may be established. Fractures that can be treated without operation — Aftercare: In the average case the elbow should be immobilized in flexion for about three weeks. At the end of that time the callus is hard enough to allow the elbow to be lowered to a right angle in a sling. In another week or two, all fixation may be discontinued and the child allowed to use the hand at his own discretion. It has been adequately proved that more rapid return of normal function will occur if the child is unmolested. Carrying pails of sand does more harm than good. There should be no manipulation to increase motion either with or without anesthesia. Repeated stretching of contractures not only distresses the child but perpetuates the spasm and delays the return of normal function. Occasionally there is an indication to continue traction until callus is solid. When angular deformity persists at the end of three or four weeks, the fracture may be manipulated under anesthesia and satisfactory position obtained. Bayonet apposition with normal alignment is satisfactory and is not an indication for manipulation at this stage. As in fractures of other long bones, sharp edges round off as growth continues.

Fractures of the medial epicondyle: In a fresh case the fragment should be pinned back in position. The ulnar nerve may be exposed during

the operation, but it is rarely injured and may be left in its groove. If operation is not done until two weeks after the injury, it is better to excise the fragment and suture the aponeurosis of the muscle to the humeral condyle. Open reduction and internal fixation performed four weeks or more after the injury are followed by only a fair result and prompt operation by an excellent one. The elbow should be immobilized in right angle flexion for four weeks postoperatively as described for lateral condylar fractures. Fractures of the radial neck: If the displacement is only partial, so that there is some apposition and the angulation is 45 degrees or less, one may be able to manipulate the fragment so as to improve the position. Then the treatment should be conservative. A cast is applied with the elbow flexed to 90 degrees or more acutely. After removal of the plaster, there will be a period of marked disability during which all motions are greatly restricted. Such disability may last for several months. The temptation is great to exercise the radial head in order to increase the range of motion. While the immediate effect is favorable, the late results are tragic. If the operative reduction is delayed or if the fracture is of the comminuted type, considerable new bone will be formed and motion will be restricted for some time. Satisfactory motion will gradually return in most cases. Physical therapy is contraindicated.

Treatment of Acute Subacromial Bursitis. Harry Merliis.

J. M. Soc. New Jersey 48:515 (Nov.) 1951.

The patient with acute subacromial bursitis is usually in such severe pain that treatment must be considered as an emergency procedure. Most of these patients are treated with local Novocain injections with or without irrigation or with x-ray therapy. Some orthopedists advocate immediate surgical exposure and evacuation of the subacromial bursa. No matter what procedure is favored, almost all therapists recognize the value of an immobilizing dressing, the local use of ice and sedation as adjunctive therapy. However, a review of the pathophysiology of acute subacromial bursitis brings out facts that make one wonder whether the primary treatment is not adjunctive and the adjunctive therapy primary. The pathophysiology also points out the self-limited character of acute subacromial bursitis. The rationale of therapy is to relieve intra-bursal tension and reduce the inflammatory response by preventing contusion of the intra-bursal tissues. A critique of existing methods of therapy is given in this discussion together with a case of acute subacromial bursitis that was easily handled with traction, immobilization, ice and Demerol, without more active treatment. A series of seven cases, all treated in the same manner, is presented which shows uniformly good results. Pendulum exercises usually were not started until the seventh day, and motion usually returned rapidly. In one case complete internal rotation remained painful.

Myositis Ossificans Occurring in Poliomyelitis: Report of a Case. W. E. Hess.

Arch. Neurol. & Psychiat. 66:606 (Nov.) 1951.

A review of the literature fails to produce a specific incident of myositis ossificans developing in a paralytic patient whose paralysis was the result of anterior poliomyelitis. Since it is well known that myositis ossificans occurs in more than four per cent of patients with paraplegia from other causes, it would appear that it could occur with poliomyelitic paraplegia. A case is reported which demonstrates this. A seven-year-old girl with anterior poliomyelitis was given treatment consisting of routine physical therapy—daily application of hot packs, muscle reeducation, passive stretching of all taut muscle groups, and bed rest on a firm mattress with a footboard. Use of the hot packs was terminated after six weeks, when all muscular tenderness had subsided. Active and passive physical therapy was then continued. Three months after admission, while undergoing stretchings of the hamstring muscles, the patient sustained an oblique fracture of the right midfemoral shaft. Evidence of a preexisting myositis ossificans was already present, as shown by the immediate postfracture roentgenograms. The process proceeded to ossify and to consolidate further during the period of immobilization of the fracture. The likeliest cause of the myositis ossificans was trauma from overzealous stretching in the treatment of the paralysis. The danger arising from such stretching is emphasized.

Poliomyelitis in Adults in Seattle in 1949. John L. Bakke, and James W. Haviland.

Northwest Med. 50:846 (Nov.) 1951.

The cases of poliomyelitis occurring in adults during one season and observed on a single ward are presented as probably representative of what was occurring simultaneously statewide. This report covers sixty adult poliomyelitis patients admitted to the medical service of King County Hospital in Seattle in 1949. Males predominated in paralytic cases, but very few paralytic cases occurred in the group over thirty-three years of age. It is the general consensus that incidence of poliomyelitis in pregnant women exceeds that in the population at large. Furthermore, they are more susceptible to bulbar paralysis. Although debated by some, it seems fairly well-established that tonsillectomy does predispose to poliomyelitis, especially the bulbar form. Symptoms of headache, stiff neck, malaise and aching of muscles, particularly those of the back and thighs, occurred in virtually all sixty patients. Muscle examinations by the physical therapy department and orthopedic surgeons revealed that fourteen of the nineteen patients with spinal paralysis had predominance of paralysis on the right side and three or five patients with cranio-bulbar paralysis had predominance of weakness on the dominant side. In addition to careful general management, therapy consisted of frequent hot moist packs, bed boards, and appropriate daily physical therapy. Three of

thirteen patients had abnormal electrocardiograms. Attempts to isolate poliomyelitis virus from fresh myocardium of a fatal case with clinical evidence of myocarditis were unsuccessful.

Myositis Ossificans with Report of a Case in Paravertebral Muscle. Bennett Creech, and J. U. Gunter.

North Carolina M. J. 12:595 (Dec.) 1951.

Myositis ossificans is characterized by aberrant bony growth within skeletal muscle. Although it is found most frequently near the long bones, myositis ossificans may develop in any of the muscle groups of the body. However, Creech and Gunter were able to find only two cases involving paravertebral muscle. Prophylactic treatment of myositis ossificans includes avoidance of massage, the application of cold compresses or ice packs, and the use of a compression bandage immediately after injury in order to reduce hemorrhage. Thorndike states that evacuation of a hematoma in its early stages is contraindicated. The best treatment consists of rest, followed in a minority of cases by surgical excision when necessitated by symptoms of a mechanical nature persisting in its mature stage.

The Orthopedic Management of Arthritis. Peter L. Carnesale, and Mark W. Garry.

Am. Pract. 2:840 (Oct.) 1951.

Complete and proper management of arthritis should consist of medical, physical therapy, psychiatric and orthopedic measures. The orthopedist often includes the physical therapy measures as part of the treatment; and the physician, the psychiatric. Medical treatment alone will not suffice for the severe arthritis and neither will orthopedic treatment alone. It is essential that everyone treating arthritis should know and understand the simple orthopedic principles which are involved in the management of arthritis. Function in arthritis may be preserved when the following factors are taken into consideration during treatment: (1) Rest — mechanical and physiologic; (2) immobilization and mobilization; (3) optimal position of rest and function; (4) prevention of deformity; (5) physical therapy — modalities and application, and (6) maintenance of normal body posture.

The use of physical therapy is a field in itself and is not stressed in this paper. The function of a joint will often return spontaneously after the acute symptoms have subsided. Function will improve more rapidly with the use of proper physical therapy and rehabilitation, using means such as heat in its various forms and massage followed by motion under supervision. Close observation to note reaction to treatment is necessary. Reappearance of swelling, heat and pain may mean the treatment is too vigorous. It should be stopped until symptoms subside and then resumed with less vigor. If there is no reaction, more intensive treatment is encouraged. Each patient must be handled individually in this regard. Whirlpool or paraffin baths, heat and

gentle massage, are recommended prior to attempted motion. This therapy should be done under the supervision of a physical therapist or at least by one who has the patience, time, and knowledge that is required. How long one should continue this treatment depends upon the patient; no two are the same. Supervised motion and physical therapy should continue as long as increase in motion is noted. The splints should be used especially at night for as long as one suspects that contractures may develop without the splints. However, if the patient is afebrile, the sedimentation rate is normal or approaching normal and the patient is responding to physical therapy, the splints should gradually be dispensed with but the patient also should be closely observed. If it is noted that there is a recurrence of a contracture, the splints should again be resumed.

Treatment of Parkinson's Syndrome: Some Practical Considerations. Joseph C. Yaskin.

Pennsylvania M. J. 54:1156 (Dec.) 1951.

Parkinson's syndrome is a condition characterized by increased tone of the voluntary, and to a lesser extent, involuntary muscles, resulting in slowing up of various voluntary movements, and accompanied by characteristic changes in posture, gait, movements of the limbs, speech, and often accompanied by involuntary movements of a characteristic type. The course of the disease varies considerably. Some unilateral Parkinson cases may remain in a state of relative usefulness for many years. Others become markedly incapacitated in a short time. However, the prognosis and course of Parkinson's syndrome can and should be modified by well-considered management. It has long been recognized that rest, so necessary in the treatment of many diseases, is not helpful in Parkinson's syndrome. The individual should be encouraged to keep up his usual physical activities, and he should be warned that immobilization in the case of Parkinson's disease is a part of a vicious circle. The physician should keep in mind that physical inertia is a part of the disease, especially so in postencephalic parkinsonism, where drowsiness is not uncommon. On the other hand, it should be remembered that violent physical exercise tends to increase muscle rigidity and should be discouraged. Physical therapy under the guidance of trained personnel is unquestionably helpful in preventing or at least retarding invalidism.

Effects of Temperature of Local Baths on Deep Muscle Temperature. R. N. Danielson, and F. W. Kinard.

J. Applied Physiol. 4:373 (Nov.) 1951.

Many measurements of tissue temperatures, both in man and in other animals, have been made by various workers. Nevertheless, when curiosity arose as to the extent to which the muscles of an extremity might be warmed or cooled by immersion of the limb in a water bath, very few pertinent data could be found in the available litera-

ture. This study showed that immersion of the limb of the dog in a water bath at a temperature higher or lower than that of the extremity leads to a prompt and marked change in the deep muscle temperature of the limb in the direction of the bath temperature. This change in muscle temperature is enhanced by occlusion of the circulation. Rectal temperatures are affected in the same direction but to a lesser extent when the circulation is intact, but are unaffected when the circulation is occluded. At an elevated bath temperature, irreversible damage to tissues may be produced when there is interference with the circulation, although no damage appears under similar conditions when the circulation is intact.

Some Clinical Applications of Ergography. F. A. Hellebrandt, and Sara Jane Houtz.

J. Bone & Joint Surg. 33-A:968 (Oct.) 1951.

No branch of medical practice is called upon more frequently than orthopedics for the purpose of evaluating the magnitude and the functional significance of disabilities affecting the neuromuscular and skeletal systems. The merits of objectivity in disability evaluation are self-evident, especially when the evaluation is to be used in the adjudication of compensation claims due to industrial injuries or to injuries sustained during service in the armed forces. Such disability evaluation usually is based, as it should be, upon the judgment of the examining physician. Although no instrument can replace the knowledge, skill, and insight of the experienced observer, many of the basic components of physical demands and capacities analysis are amenable to direct measurement. When these are appraised quantitatively, the objective evidence obtained serves as a valid and reliable guide to the examiner and lessens the burden of proof in much the same way that an electrocardiogram may be used to sustain the view of an internist. The period since the onset of World War II has witnessed the evolution of what Rusk has aptly called the third phase of medical practice — dynamic convalescent care which bridges the gap between the end of definitive treatment and the restoration of maximal residual function. His concept has focused increasing attention on the social and economic advantages of utilizing remaining abilities

for industrial purposes by the selective placement of impaired workers. Before this can be done, facilities for, and techniques of treatment must be available for the full physical restoration of the disabled. This is the most important step in rehabilitation. Functional capacities must then be assessed in order to match the patient's abilities with the demands of job assignment. The merits of ergography in relation to the evaluation of disability, the quantification of exercise dosage, and the objective measurement of progress should be considered. Ergography may be useful as a guide to the medical examiner in the evaluation of the functional status of the orthopedically disabled at the onset of treatment, the critical appraisal of end results, the determination of the end point of effective rehabilitation, and the magnitude of residual dysfunction. Although adequate management of the patient usually requires no specialized techniques to evaluate functional status, high degrees of precision in measurement are sometimes desired. Objective testing then has special merit; it enables the examiner to support his deductions with demonstrable evidence.

Pedagogical and Performance Factors of Manual Artificial Respiration with Naval Personnel—V. Archer S. Gordon; Shirley Star; Fred Meier; Creighton Hale, and A. C. Ivy.

J. Applied Physiol. 4:447 (Dec.) 1951.

Observations and rating of the performance of methods of manual artificial respiration by 667 naval recruits and 124 Waves revealed that both the arm-lift back-pressure and variations of the hip-lift back-pressure can be successfully taught to naval recruits in relatively brief training sessions as used in this test. Of these methods, the arm-lift back-pressure surpasses all the variations of the hip method in accuracy of performance, ease of learning — as measured by the need for an amount of correction — and physical ease of performance. Among the hip methods, the hip-lift back-pressure, especially when an adjunct is used in its performance, is most easily learned and accurately performed. However, it is physically harder to do than the hip rolls. Hip methods, unlike the arm method, result in greater fatigue for the operator when the subject is appreciably larger than the operator.



RESOLUTION APPROVED

The report of the Council on Medical Education and Hospitals of the American Medical Association was approved by the Advisory Board of Medical Specialties at its business meeting on February 10, 1952. Included in this report was the following Resolution:

"Whereas, An emergency medical call service is of proven value both as a community public service and as a means of good public relations between a physician and his community; and

"Whereas, Participation in such a service is not onerous if many physicians cooperate; and

"Whereas, Every County Medical Society has been asked to operate such an emergency service; therefore be it

"Resolved, That every doctor below the age of 35 years, regardless of his type of practice, be urged to participate in his community's call plans; and be it further

"Resolved, That all national specialty boards be requested by the Secretary of the American Medical Association to facilitate such general participation by assuring their members and potential members that they may participate in such a community activity without jeopardy to specialty ratings.

"Amendment —

"Resolved, That all national specialty boards be requested by the American Medical Association to facilitate such general participation by assuring their members and potential members that they may participate in such a community activity without jeopardy to specialty ratings."

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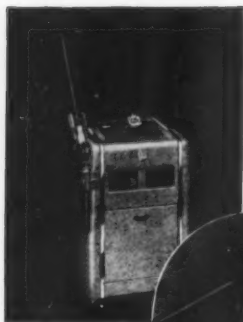
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The October meeting of The Chicago Society of Physical Medicine and Rehabilitation will be held on Wednesday, October 22, 1952, at the Stritch School of Medicine, Loyola University, 706 S. Wolcott Street, Chicago, at 8:00 P. M. Dr. Irvin Hummon will present the topic "Correlation Between Radiology and Physical Medicine." Diagnosis will be discussed by Dr. Edward G. Warnick.



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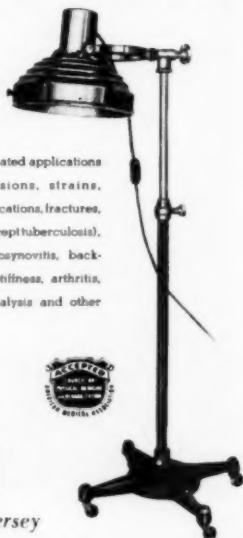
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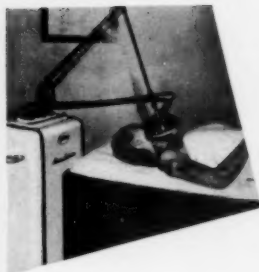
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